

# LA APROPIACIÓN DE LAS RENTAS DEL SUELO EN LA CIUDAD NEOLIBERAL ESPAÑOLA<sup>1</sup>

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## RESUMEN

Se analiza el cambio experimentado en España en cuanto a la producción y patrimonialización de las rentas urbanas, desde el régimen de acumulación fordista al neoliberal, a partir de la evolución de la legislación urbanística y financiera posterior a 1990.

En el periodo neoliberal las entidades financieras han incrementado su hegemonía y los propietarios del suelo han sido desplazados por los promotores gracias a las políticas urbanísticas de liberalización del suelo.

Las innovaciones financieras, anteriores a las reformas urbanísticas, han intensificado las políticas neoliberales hasta el crac de 2007.

**Palabras clave:** Renta urbana, urbanismo neoliberal, financiarización, España.

## ABSTRACT

The paper analyses the change experienced in Spain in terms of production and capitalization of urban land rent from the Fordist regime of accumulation to the neoliberal regime. This analyses focus on the evolution of urban and financial legislation since the mid-nineties.

During the neoliberal period, financial institutions have increased their hegemony and the owners have been displaced in favor of the developers by the planning policies of the liberalization of land.

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New financial products, chronologically earlier, has been driven urban policies. At the same time, it has increased neoliberal policies which have carried out to the crash of 2007.

**Key words:** Urban land rent, neoliberal urbanism, financialization, Spain.

## I. INTRODUCCIÓN

En la evolución del capitalismo histórico (Arrighi, 1999) los mecanismos de producción del espacio urbano se han ido transformando en paralelo a la propia transformación del régimen de acumulación dominante. Cada fase del capitalismo ha tenido, y tiene, una forma específica de producción de espacio (Lefebvre, 1991) y, por tanto, una forma concreta de apropiación de las rentas del suelo generadas por aquella producción. De tal manera que, en función de cuál es el régimen de acumulación dominante, se implanta una forma de crear y repartir la plusvalía vinculada al producto suelo. Todo ello en función del rol que ejercen los distintos agentes del suelo que, finalmente, determinan la producción de la urbanización capitalista (Harvey, 1985).

En la transición del feudalismo al capitalismo la apropiación de las plusvalías de la tierra se llevó a cabo, entre otros, mediante el proceso de acumulación originaria de los bienes comunales que implantaron los *enclosures* o cercamientos (Linebaugh, 2008; Madrilonia.org, 2011). Con el capitalismo del siglo XIX se reestructuró el control de la nueva propiedad en las ciudades con la aparición de una nueva clase de propietarios: la burguesía urbana. A partir de entonces, esta emergente clase rivalizaría con la nobleza por el dominio de un recurso «tierra» (agrícola) a la que, progresivamente, se empezaría a denominar «suelo» (urbano).

En el siglo XIX, el Estado se posicionó como agente decisivo en el nuevo régimen de propiedad del suelo promoviendo sucesivas desamortizaciones que ponían en manos de la emergente burguesía la titularidad de un número importante de propiedades tanto rústicas como urbanas. En el siglo XX, con el régimen de acumulación fordista, ganaba fuerza la propiedad pública, la cual, ofreciendo servicios a los no propietarios, suavizó el conflicto de clase entre propietarios y no propietarios (Madrilonia.org, 2011). Hoy, con el régimen de acumulación neoliberal o postfordista, la disputa más visible para la apropiación de una parte de la renta del suelo se da entre los titulares de la propiedad del suelo urbano o urbanizable y los promotores inmobiliarios pero la parte más importante de la misma se la apropian las distintas entidades financieras. En otras palabras, la disputa se da entre los que detentan la propiedad del suelo y los que gestionan el negocio. Unos gestores, estos últimos, progresivamente más vinculados y dependientes de las entidades financieras que aportan el capital necesario para financiar tanto la promoción inicial como la posterior compra de los inmuebles por parte de los particulares.

De ahí que para entender el espacio urbano resulta imprescindible el análisis de la transformación de estos mecanismos de producción de la renta del suelo y los agentes que se la apropian. En el periodo de tránsito desde el capitalismo fordista al postfordista, al crecer la dependencia de todo el proceso de la progresiva financiarización del suelo, el mercado inmobiliario, indirectamente, se ha integrado de lleno en los circuitos globales del capital en sintonía con las también expansivas políticas empresarialistas que han azotado la ciudad neo-

liberal. El empresarialismo urbano supone competir en el entorno del capitalismo financiero lo que ha afectado a los espacios urbanos en general y al mercado inmobiliario en particular que se han tenido que adaptar a estos procesos para escalar en la jerarquía urbana (González, 2007; Hackworth, 2007).

En el caso español, el proyecto de neoliberalización ha tenido lugar especializándose económicamente en el circuito secundario de acumulación (Harvey, 1982; López y Rodríguez, 2010). Una especialización que ha sido posible gracias a un importante cambio en el mecanismo de producción y apropiación de las plusvalías urbanas. La progresiva atenuación de la importancia y hegemonía de los propietarios del suelo, paralela al mayor protagonismo de promotores y entidades financieras les ha convertido en agentes dominantes a la hora de la apropiación de las rentas del suelo.

Este texto pretende estudiar esta cuestión para el caso español a través del análisis de dos procesos paralelos que consideramos imprescindibles para la comprensión íntegra del asunto. En primer lugar, la evolución de la legislación urbanística aprobada desde la década de 1990 ya que ha sido la que ha permitido la revalorización del suelo, la expansión masiva de la urbanización y, finalmente, la apropiación de la renta del suelo por parte de promotores y entidades financieras. Y, en segundo lugar, la evolución de la legislación hipotecaria, que es la que ha hecho posible la financiarización del suelo y su integración en los circuitos globales de capital a través de la titulización hipotecaria. En definitiva, dos mecanismos que son los que han determinado la implantación de un régimen de acumulación sustentado sobre el espacio urbano y que caracteriza a la crisis actual (Harvey, 2012: 51-106).

## II. LA NEOLIBERALIZACIÓN DE LA LEGISLACIÓN URBANÍSTICA ESPAÑOLA: EL PROGRESIVO PROTAGONISMO DE LOS PROMOTORES FRENTE A LOS PROPIETARIOS

En el contexto de la renovación de los conceptos y paradigmas que experimentó la Geografía española en la década de 1970, Horacio Capel, en 1975, afirmó de forma diáfana que *«la producción del espacio urbano es el resultado de las prácticas de unos agentes que actúan dentro del marco del sistema capitalista, utilizando los mecanismos legales a su disposición o realizando su actuación al margen de estos mecanismos y obteniendo posteriormente la sanción legal correspondiente»* (Capel, 1975: 85). Es decir, los agentes urbanos acatan la ley si ésta es concordante a sus objetivos, en caso contrario la cambian. El trabajo citado fue innovador en la geografía urbana española que *«recogía influencias de la sociología francesa, de geógrafos anglosajones y de los urbanistas de la Escuela de Arquitectura de Barcelona, para construir aportaciones que cambiaron la forma de entender la ciudad y la urbanización»* (Lois, 2013).

Las actuaciones y reglas del juego del urbanismo español para la producción de la ciudad, especialmente de la nueva ciudad, presenta singularidades importantes con respecto a otros sistemas. El sistema urbanístico español, ya desde las disposiciones del siglo XIX<sup>2</sup> y hasta las

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2 Véase especialmente la Real Orden de 1846 sobre *«Planos Geométricos de las Poblaciones de Crecido Vecindario»*, la Real Orden de 1854 sobre *«Clasificaciones de las Calles y alturas correspondientes de los Edificios con frente a ellas»* y la Ley de 29 de junio de 1864 de *«Ensanche de Poblaciones»*.

leyes del suelo que inaugura la de 1956<sup>3</sup>, reconoce a los propietarios del suelo clasificado por el plan municipal el derecho preferente a apropiarse y prattrimonializar las plusvalías urbanísticas alumbradas por el propio plan a cambio de asumir determinados deberes. Se institucionalizó así una nueva concepción de la propiedad del suelo que asumió el deber de urbanizar (cesión de espacios para dotaciones, costeo de la urbanización, edificación en plazo y cesión del 10% del aprovechamiento a partir de la reforma de 1975) a cambio de garantizar al propietario el derecho a apropiarse, de forma exclusiva, del aprovechamiento urbanístico generado por la simple aprobación de los planes<sup>4</sup>. Como se ha señalado *«La LS 56 estableció una especie de compromiso histórico entre la sociedad y la propiedad. Por una parte impuso la plena soberanía del interés público por medio de la acción colectiva del planeamiento. De esta manera el Plan decidiría de forma omnímoda el uso del suelo por medio de las técnicas de la clasificación y la calificación. Pero por otra concedió en exclusiva a la propiedad del suelo el derecho al desarrollo urbano, atribuyendo a la misma la responsabilidad de «hacer ciudad» (la urbanización), así como el monopolio al uso y disfrute de los beneficios del desarrollo urbano (el aprovechamiento urbanístico generado por los planes)»* (Roca, 2007: 162). Un aprovechamiento que, hay que repetirlo y recordarlo, alumbraba por obra y gracia de la propia administración al llevar a cabo la aprobación de los correspondientes planes.

Como consecuencia de ello los planes urbanísticos de la segunda mitad del siglo XX blindan el dominio útil urbano, el aprovechamiento que el plan dibuja y localiza, a favor de los propietarios fundiarios de los terrenos. Unos propietarios que en ocasiones han sido tildados de «quiritarios» pues son los únicos que podrán materializar y prattrimonializar el aprovechamiento -existente o expectante- que el plan fija y localiza. La localización geográfica en parcelas privadas del aprovechamiento decidido por el plan público debería ser «objetivamente», en teoría, la más apropiada para acogerlo. Todo ello, supuestamente, sin averiguar de quién son los terrenos privados que los van a acoger, sin mirar la titularidad.

La cuantía de la edificación posible sobre los terrenos clasificados la establecen los parámetros urbanísticos al uso: coeficientes de edificabilidad o profundidades edificables, alturas e índices de intensidad de uso, para citar los más importantes. Estos valores representan los límites formales y morfológicos materializables que blindan el plan urbanístico a favor de unos propietarios que a priori, supuestamente, desconoce. Así la licencia se convierte en un simple acto reglado que sólo concreta, a escala de proyecto, lo que el plan ya ha reconocido como derecho de los «anónimos» propietarios.

Este sistema, según los estudios comparados, es más bien singular, no cuenta con demasiadas equivalencias internacionales (García-Bellido, 1999). En otros países es la licencia lo que crea derechos y no el plan por lo que no proliferan los cálculos de capacidad urbanística potencial (siempre indicativa) según los planes municipales. En otros estados lo que se suele calcular es cuánta agua hay dentro del vaso y cuánta se quiere añadir, no cómo de grande se

3 Ley de 12 de mayo de 1956 sobre *«Régimen del Suelo y Ordenación Urbana»*. BOE núm. 135, de 14 de mayo de 1956. corrección de errores en BOE núm. 157, de 5 de junio de 1956.

4 La reforma, en 1975, de la ley del suelo del 1956 (texto refundido de 1976) rebajó, como ya hemos apuntado, hasta el 90% la posibilidad de apropiación del aprovechamiento urbanístico por parte de los propietarios. Un porcentaje que, desde entonces ha ido fluctuando en función de las diferentes reformas legislativas tanto estatales como autonómicas.

ha hecho el vaso para que, si los propietarios quieren, lo rellenen. De lo apuntado se deducen algunas derivadas a tener en cuenta.

En primer lugar, en otros países, la aprobación de los planes no se ve sometida a la presión que se ejerce en el caso español. Como los planes no reparten derechos a urbanizar y/o edificar la discusión es de carácter más general, más de modelo y menos crematística; en consecuencia no aparecen con tanta frecuencia los vergonzosos casos de recalificaciones urbanísticas fraudulentas ya que el planificador no se ve tan presionado como en el Estado español para que acceda a tal o cual calificación urbanística. El plan no reparte aprovechamientos del suelo, por tanto no hay motivo para presionarlo.

En segundo lugar, mientras el Estado español tiene un parque residencial construido que es la parte llena de un vaso con mucha más capacidad (en el mejor de los casos suele estar un 50% lleno), la mayor parte del resto de sistemas urbanísticos el parque construido es todo el vaso y va creciendo a medida que se van asumiendo, sin ninguna obligación a hacerlo, los proyectos<sup>5</sup>.

Al fin y al cabo puede que el resultado final del proceso sea similar en cuanto al grado de insostenibilidad de todos los sistemas urbanos occidentales ya que, como se ha visto, la afección de la crisis no ha dependido tanto del sistema urbanístico vigente como de la política financiera que han sancionado los distintos gobiernos. Por agregación de nuevos pedazos de ciudad vía proyectos o por colmatación de los ámbitos que el plan prevé, la producción social del espacio puede desembocar en resultados muy similares. Pero hay, como mínimo, dos diferencias a resaltar. Por un lado, en el Estado español, la aprobación de los planes con las correspondientes expectativas de plusvalías urbanísticas muy a menudo está acompañada de palabras como especulación y corrupción. Por otro lado, hay que resaltar como la presión constante para conseguir la aprobación de planes que blinden el aprovechamiento a favor de empresas y particulares –quien tiene más capacidad de influir en las decisiones de la administración– genera una especie de autopropulsión hacia la insostenibilidad. Con este sistema es la codicia por el aprovechamiento blindado la que mueve todo el entramado y no la viabilidad social, ecológica y económica de los proyectos<sup>6</sup>. En esta línea García-Bellido presentaba este modelo, que perpetuaba los preceptos básicos de la franquista ley de 1956, como «*la perversión radical del endemismo histórico del mundo del ladrillo (...) [ya que] es demasiado tentador el dinero fácil que este sistema engendra*» (García-Bellido, 2004: 294).

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5 Para un análisis comparativo de nuestro sistema urbanístico frente a los extranjeros es imprescindible consultar la obra de Javier García-Bellido (<http://www.ub.es/geocrit/garcibel.htm><http://perso.wanadoo.es/javgb78> y [http://www-cpsv.upc.es/ace/Articles-n3/25\\_BIBLIOGRAFIA.pdf](http://www-cpsv.upc.es/ace/Articles-n3/25_BIBLIOGRAFIA.pdf)) [consultada 4-04-2013], especialmente el ya citado (García-Bellido, 1999). En la misma línea también puede consultarse, (Muñoz, 2009).

6 Los casos de corrupción asociada a las Áreas de Reconversión Territorial (ART) a raíz de la aprobación del PTI de Mallorca (2004) han sido posibles, entre otros, gracias a este paradigma urbanístico singular que se da en el Estado español. El PTI mallorquín, aun siendo un plan territorial, al absorber funciones típicamente urbanísticas a los ayuntamientos, blindó el aprovechamiento a favor de unos determinados terrenos, usa la "varita mágica" de la clasificación urbanística, con lo que la potencial corrupción sube como la savia hacia los órganos insulares de la administración actuante. De hecho el mismo Consell de Mallorca, en sesión plenaria de 13 de enero de 2011, eliminó las ARTs de su plan territorial para eliminar de raíz las regalías conseguidas con anterioridad a la aprobación del plan en 2004.

## 2.1. La evolución neoliberal de la singularidad urbanística española

En la década de 1990, ya en plena etapa neoliberal a escala global, los impulsos empresarialistas plantean explícitamente la necesidad de un cambio urbanístico que liberalizara el singular sistema español de producción urbana. Pero no hay una sola hoja de ruta a seguir para ello sino dos que conducen a escenarios diferentes en una especie de reedición transformada de las decimonónicas disputas entre liberales y conservadores. Al fin y al cabo se discute en los mismos términos que se hacía en el XIX: ¿quién captura las rentas del suelo?, ¿sus tradicionales propietarios o los nuevos emprendedores? En el segundo caso, como en el siglo XIX, será necesario desamortizar.

En la década de 1990 se perfilaron los dos grandes modelos que, en 1989, García-Bellido ya había predefinido como modelo agregado o monocéfalo vs. modelo desagregado o bicéfalo (García-Bellido, 1989: 210-221). De forma muy genérica puede afirmarse que la senda desagregada, más liberal/empresarial, fue auspiciada y promovida desde las políticas socialistas mientras que la agregada, de carácter más conservador, fue por la que apostaron las políticas de los populares. Las tesis desagregadas diferencian claramente la ordenación física-objetiva de los planes frente a la subjetiva que atañe a las consecuencias económicas de la urbanización. Por su parte, la tesis de la propiedad agregada ve ambas ordenaciones como un todo unitario, integral e indivisible.

De todas formas ambas vías se entremezclaron políticamente defendiendo, en no pocas ocasiones, los socialistas el modelo conservador y los populares el liberal hasta el extremo que hoy en día no es fácil deslindar propuestas claramente diferentes en función de los dos postulados políticos supuestamente alternativos. Veamos como aterrizaron las ideas urbanísticas neoliberales sobre el singular sistema urbanístico español.

Desde la izquierda urbanística, una vez abandonados los postulados a favor de la promoción pública de todo el suelo urbanizable que todavía podían oírse en la década de 1970 y principios de la de 1980, se empezaron a formular nuevas vías de actuación en la cuestión que nos ocupa. Ya en la década de 1980 y principios de la de 1990, se dieron algunos aislados intentos de romper el monopolio de la propiedad a la hora de patrimonializar las plusvalías urbanísticas. Pero lejos de plantear la tradicional fórmula izquierdista de promoción y plusvalías públicas, que los laboristas británicos habían defendido (García-Bellido, 1975), los planteamientos progresistas de los 80s se inclinan por promover la competencia entre promotores a la hora de hacerse con el aprovechamiento urbanístico del suelo, especialmente del suelo urbanizable. Para romper el monopolio la única manera de hacerlo, con la legislación urbanística española en mano, era por la vía del Suelo Urbanizable no Programado (SUNP) que, como es sabido, podía concursar la adjudicación de los Programas de Actuación Urbanística (PAU) entre promotores no necesariamente propietarios del suelo (García-Bellido, 1993: 183-5). Esta vía se intentó, aunque de forma espuria, sin los resultados deseados por algunos de sus más fervientes defensores.

### 2.1.1. Primeros planteamientos teóricos

Desde el punto de vista doctrinal en 1993, cuando ya se había aprobado alguna importante ley financiera liberalizadora de la que hablaremos más adelante, ven la luz dos tra-

bajos que, defendiendo propuestas urbanísticas no coincidentes, hacen votos a favor de la «liberalización» del mercado del suelo. El primero lo elaboró el Tribunal de Defensa de la Competencia (desde ahora TDC), data de mayo de 1993 y es conocido como *Informe sobre Competencia en el Mercado de Suelo Urbano*<sup>7</sup> (López de Lucio, 1997, p. 86-8) y al mismo ya nos hemos referido en otras ocasiones (Rullan, 1999: 12-4; 2012: 181-2 y 190).

El informe, por lo que hace referencia a las modificaciones del modelo urbanístico español sugeridas como necesarias tienes dos líneas argumentales claras. La primera señala que, en suelo urbanizable, se debe «Permitir a los particulares decidir sobre el uso del espacio» y la «Utilización urbanística del suelo urbanizable de conformidad con la iniciativa de los particulares». La segunda establece que una vez definido el suelo no urbanizable «en función de valores medio-ambientales, paisajísticos y ecológicos. El resto del territorio debe ser, en principio, urbanizable» (CyTET, 1994: 154-5).

Se trataba, por tanto, de liberalizar por la vía agregada y monocéfala definida por García-Bellido 4 años antes pues la iniciativa de los particulares (léase propietarios) podrá decidir urbanizar todo el suelo no expresamente protegido. Eugenio Burriel ha comentado en alguna ocasión con razón que ahí estaba el «Alien» de la futura ley del «todo urbanizable» que verá la luz cinco años más tarde. Liberalizar, ahí, debe leerse como liberar de las restricciones que impedían urbanizar a los propietarios.

En 1994, desde el mismo gobierno de España que había promovido el informe de 1993, se promueve (ahora desde fuera del TDC) el llamado «Informe sobre suelo y urbanismo en España» conocido como «Informe de Salamanca» por haber sido presentado en esta ciudad día 12 de diciembre de 1994<sup>8</sup> (López de Lucio, 1997, p. 88-90). El informe contrarresta los planteamientos agregaduristas del TDC y hace votos a favor de planteamientos desagregados como los que ya se habían aprobado en la comunidad Valenciana en el mismo 1994 y a los que nos referiremos más adelante.

El segundo aporte doctrinal de calado para la pretendida liberalización del suelo data también de la primavera-verano de 1993. Es la publicación del artículo de Javier García-

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7 En el número 99 de la revista *Ciudad y Territorio. Estudios Territoriales* (1994: 157-162) reproduce el documento en cuestión (datándolo en mayo de 1993) que formaba parte del informe más amplio llamado *Remedios políticos que pueden favorecer la libre competencia y atajar el daño causado por los monopolios* elaborado, por el antiguo Tribunal de Defensa de la Competencia. El informe completo puede consultarse en <http://www.encompetencia.es/Inicio/Informes/Estudios/tabid/228/Default.aspx?pag=3> [consulta 7/04/2013].

El informe se elaboró en el contexto del Programa de Convergencia y fue promovido políticamente desde el ministerio de Economía y Hacienda dirigido por Carlos Solchaga (1985-93). Dicho ministro, en un artículo publicado en *El País* hace una elocuente llamada, desde las filas socialistas, en defensa de los propietarios y contra el que considera excesivo intervencionismo de la administración. Unos planteamientos que nutrirán ideológicamente el informe del TDC como el mismo autor, poco después de dejar de ser ministro y pasar a presidir el grupo socialista del congreso, nos aclara al afirmar que sus planteamientos se han elaborado a la luz de las «consideraciones (...) de un trabajo que está en marcha y que he venido conociendo en mi responsabilidad anterior de ministro de Economía y Hacienda. Se trata del borrador de un informe del Tribunal de Defensa de la Competencia. Dicho informe fue solicitado del citado organismo por el Gobierno como consecuencia de los compromisos adquiridos en materia de desregularización y liberalización de los servicios en el Congreso de los Diputados durante el debate del Programa de Convergencia. Espero que el hecho de que M. A. Fernández Ordóñez, su presidente, continúe siendo amigo mío después de haber sido uno de mis secretarios de Estado no le restará fundamento a este borrador del futuro informe» (Solchaga, 1993).

8 La parte final del informe titulada «Recomendaciones finales de avance normativo y política de suelo» ha sido publicada en *Ciudad y Territorio. Estudios Territoriales* (1995, núm. 103: 165-189).



Bellido *«La liberalización efectiva del mercado del suelo. Escisión del derecho de propiedad inmobiliaria en una sociedad avanzada»* (García-Bellido, 1993). En dicho trabajo el autor, como ya había hecho en el trabajo ya citado de 1989, distingue (desagrega) con nitidez el dominio del suelo del dominio útil urbano.

El primero, el dominio del suelo, es *«el haz de derechos del propietario [...] que se refieren exclusivamente a las funciones individuales derivadas de las facultades civiles esenciales de goce y disposición del título jurídico; cuya función social es la del "deber de conservar y cultivar" el dominio útil agrario y cuidar el suelo de manera acorde con su naturaleza edafológica y sus fines sociales agrarios, mientras no sea urbanizable, y que, cuando sea destinado a fines urbanos, "debe dejar hacer", debe disponer del suelo para que sea usado con el destino público planificado»* (García-Bellido, 1993: 186).

Por su parte el dominio útil urbano es *«el haz de derechos del propietario del espacio productivo para usar y producir el bien en la forma señalada por la colectividad y sacar provecho de sus cualidades socioeconómicas, del aprovechamiento urbanístico o [...], el cual adquiere el "deber de hacer positivo", debe emprender las obras, ejercitar los deberes y adquirir los derechos que la Ley atribuye a esa propiedad urbanística, como conjunto conjunto del suelo, siendo precisamente ésa su función social* (García-Bellido, 1993: 186).

El autor apuesta claramente por esa desagregación (teoría dualista frente a la integrista) que, si se adopta en las leyes del suelo, tendría consecuencias importantes en la hora de capturar las plusvalías urbanas que la colectividad crea con la aprobación de los planes urbanísticos. Con una concepción integrista y monocéfala de la propiedad las plusvalías urbanísticas serán capturadas por los propietarios del suelo, mientras que con una concepción dualista y bicéfala éstas plusvalías serían capturadas por los empresarios urbanizadores. Se trataba de *«que desgajara del derecho de la propiedad la facultad de urbanizar y edificar, de forma que se rompiera de forma definitiva con el monopolio de la propiedad a apropiarse del aprovechamiento urbanístico generado por los planes, y de esta manera, del plusvalor que de los mismos se deriva»* (Roca, 2007: 169). Así se planteaba la liberalización del urbanismo como solución al supuesto bloqueo que los propietarios podían representar para el *«dinamismo de la construcción de la ciudad»*. Se trataba de evitar que la propiedad privada frenara la iniciativa privada.

### 2.1.2. La LRAU, primera ley urbanística desagregadora y liberalizadora

Pero la primera gran novedad en la línea de romper el monopolio quirritario de los propietarios fue la *Ley 6/1994, de 15 de noviembre, de la Generalitat Valenciana, Reguladora de la Actividad Urbanística*, la LRAU. La ley se había empezado a redactar en 1991 y su primer borrador vio la luz en 1993 (Blanc, 2007: 176-7) para abrobarse definitivamente en 1994. La LRAU se fundamenta, en gran parte, en las propuestas auspiciadas por García-Bellido y Luciano Parejo para la conformación de los mecanismos de producción de la nueva ciudad. La ley valenciana de 1994, supuso un cambio radical desde el modelo tradicional basado en una concepción monocéfala y unitaria de la propiedad a otra de cuño más empresarial y bicéfala. Quién fue Director General de Urbanismo y Ordenación de Territorio (entre 1990 y 1995) cuando se aprobó la LRAU ha manifestado que *«el modelo valenciano parte de la convicción del carácter empresarial que conlleva la actividad de producir ciudad»* (Fernández,



2011: 65), se puede decir más alto pero no más claro. Una auténtica declaración de guerra a los oídos de los planteamientos lefevrerianos del derecho a la ciudad.

Como se ha repetido en múltiples ocasiones la gran novedad de la LRAU, y las leyes autonómicas que la siguieron<sup>9</sup>, consistió en reemplazar a los antiguos propietarios «de la tierra» por los nuevos propietarios/promotores «del suelo» en la dirección e iniciativa del proceso de creación de la nueva ciudad y, consecuentemente, en la apropiación de las plusvalías generadas por dicho proceso. Fernando Roch ha señalado que *«la figura del propietario, que desde la Ley de 1956, se había convertido en una especie de urbanizador «malgré lui», se destaca como un obstáculo al progreso. (...) El propietario aparece como un parásito que obtiene un beneficio que por una actividad que realiza otro, por el simple hecho de tener en su poder la llave que abre el proceso urbanizador»* (Roch, 2001: 9).

Tanto desde posicionamientos ideológicos conservadores como progresistas se encuentran defensores (Burriel, 2009: 12-3) y detractores del nuevo modelo<sup>10</sup>. Una de las críticas más globales al nuevo modelo se ha expuesto precisamente desde Valencia (Gaja, 2011; 2003; 2008) al afirmar que *«la aplicación de la LRAU ha dejado cortas las expectativas que se derivaban de su lectura. Interpretada con una generosidad digna de mejor causa, ha sido un eficaz vehículo en la transferencia de rentas desde los propietarios fundiarios a los «industriales» inmobiliarios, sin que esta transmisión haya supuesto una moderación en los precios inmobiliarios, tanto del suelo como de la edificación, al tiempo que impulsaba una concentración de la propiedad del suelo, en pocas y cualificadas manos. La manipulación de los datos no puede ocultar la realidad»* (Gaja, 2008).

El problema, como detalla el autor, radica en pensar (diagnosticar) que el encarecimiento de la vivienda es debido, exclusivamente, al encarecimiento del suelo, a lo que Campos Venuti denominó *«especulación primaria»* (la que tiene lugar en el proceso de producción originario del suelo urbano/urbanizado), sin incidir en medida alguna a la denominada *«especulación secundaria»*, la que se produce en las sucesivas transferencias, una vez que el suelo ha alcanzado su condición de urbano y urbanizado, y que tiene en la retención su piedra angular (Gaja, 2003).

El mismo Fernando Gaja lo ha explicado con toda claridad: *«Estamos asistiendo a la promulgación de un texto, en cierto modo, revolucionario: un texto que plantea mecanismos para transferir rentas (urbanas) de los terratenientes a los fabricantes de vivienda -por supuesto que no de los propietarios de los medios de producción a la colectividad-. En cierto*

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9 No es este el lugar para tratar la diversidad de fórmulas que, las administraciones autonómicas, han adoptado para regular el acceso de los promotores no propietarios al proceso de producción de la ciudad. Recordemos simplemente los diferentes submodelos. El modelo puro de agente urbanizador ha sido adoptado por la Comunidad Valenciana (Ley 6/1994), Castilla-La Mancha (Ley 2/98) y Extremadura (Ley 15/2001); el agente urbanizador diferenciando compensación y alternativo como concesión de obra urbanizadora ha sido el modelo de La Rioja (Ley 10/1998), Aragón (Ley 5/1999) y Cantabria (Ley 2/2001); el agente urbanizador diferenciando compensación y subsidiario llamado normalmente sistema de concurrencia ha sido el que ha desarrollado Castilla y León (Ley 5/1999), Murcia (Ley 1/2001) y Galicia (Ley 9/2002); por último el agente urbanizador integrado en el sistema de compensación se ha desarrollado en Madrid (Ley 9/2001), Canarias (Decreto Legislativo 1/2000), Asturias (Ley 3/2002) y Andalucía (Ley 7/2002).

10 Ello se explica seguramente por el hecho que fuera el último gobierno socialista de la Comunidad Valenciana el que, en 1994, impulsara la nueva ley y hayan sido los conservadores del Partido Popular los que, desde su acceso al poder en 1995, la hayan aplicado y desarrollado.

modo, una "revolución burguesa", de unos detentadores de riqueza quasi feudal a otros más "eficientes", más "productivos". Leyendo la LRAU uno tiene, a veces, la sensación de encontrarse frente a un texto "desamortizador". Salvando todas las distancias (y las reticencias) que se quiera, poco ha faltado para calificar de "manos muertas" a los propietarios del suelo urbano durmiente o inactivo. (...) Los propietarios, considerados elementos parasitarios en el proceso de producción de la ciudad, son sacrificados en beneficio de los promotores profesionalizados, una forma eufemística de describir a las empresas mercantiles, de producción en régimen de "mercado" (Gaja, 2000: 85).

Soslayando que el precio final de la vivienda tiene otros componentes, especialmente vinculados a la política crediticia, se ha llevado a cabo una simple transferencia de rentas urbanas desde los conservadores propietarios del suelo (o de la tierra) a los «empreendedores empresarios promotores inmobiliarios». De hecho esto ha acontecido tanto en las comunidades con agente urbanizador como en las que no cuentan con él pero en estas últimas los propietarios han podido exigir a los promotores una parte de la tajada revalorizadora, de la renta urbana, que supone la clasificación pues, de no acceder a abonar el precio exigido, se podían negar a vender. Con la irrupción del agente urbanizador, o figura equivalente, en la legislación urbanística de las Comunidades Autónomas, se pasa de venta opcional por el precio exigido por los propietarios a venta forzosa por el precio ofrecido por los promotores. La propiedad del suelo ya no puede frenar la iniciativa urbanística.

### 2.1.3. Contraataque liberalizador integrista: 2º informe del TDC (1995), más doctrina (1995), supresión del SUNP (1996) y aprobación de la Ley 6/1998 del «todo urbanizable»

Como se apuntó anteriormente, bajo la palabra liberalización se han cobijado dos estrategias de objetivos dispares. La que desagrega propiedad de promoción de la urbanización (García-Bellido, 1993) y la que no lo hace, considerando que propiedad y urbanización forman un todo integral no desagregable del contenido esencial de la propiedad (Soriano, 1995). Ambos planteamientos, como era de esperar, se enfrentaron pues de la implantación de uno u otro derivaba que las plusvalías especulativas derivadas de la urbanización fueran a parar a manos de promotores/urbanizadores o propietarios. La LRAU apostaba por los primeros y los defensores de los segundos no se hicieron esperar.

En 1995, con la LRAU ya aprobada, el Tribunal de Defensa de la Competencia evacuó un segundo informe en defensa de su modelo de liberalización que ya había defendido en el primer informe de 1993. Este segundo informe lleva por título *La competencia en España: balance y nuevas propuestas* y en el capítulo II de las Reformas Sectoriales vuelve a insistirse en las tesis de 1993. Pero ahora para defender la tesis integrista de la propiedad debe atacar la vía que, en 1994, acababa de abrir la LRAU y que el TDC no compartía: «Aquí se prevé que los mecanismos de asignación de recursos por el mercado sean sustituidos por concursos públicos, en los que, con previa eliminación autoritaria de la propiedad, se adjudique ésta a empresas concertadas con la Administración que sean quienes se ocupen bajo determinadas condiciones del proceso urbanizador. En otras palabras, se crea un oligopolio controlado, un mercado con más componentes restrictivos que los existentes en la situación anterior y más sometido a la voluntad administrativa. Este tipo de mecanismo atenta contra

*la propiedad y contra la libertad de empresa, concede un mayor control de la oferta de suelo al Ayuntamiento, amenaza con provocar una mayor segmentación del mercado y tiene el riesgo de que las normas de cada concurso puedan estar diseñadas para cada operador "ad hoc" (TDC. 1995: 37).*

En 1995 se publica asimismo un libro que, con el expresivo título de *Hacia la tercera desamortización* (Soriano, 1995), asentaba las tesis doctrinales de la propiedad integrista. El trabajo lo firma José Eugenio Soriano que había sido precisamente el ponente del apartado sobre el mercado del suelo del informe de TDC (Soriano, 1995: 1; Fernández Ordoñez, 1994: 456) un tribunal que posteriormente presidirá. Un trabajo que sirve para contextualizar ideológicamente la tesis integrista pues, según se nos aclara, se fraguó a partir de seminarios organizados por la fundación FAES (Soriano, 1995: 2) y en el que en el prólogo, Pedro Schwartz como presidente del Instituto de Estudios de Libre Comercio, lanza frases tan emblemáticas como «*El Estado y sus municipios deberían partir del principio de que el suelo es libremente urbanizable...*» (Soriano, 1995: XIII).

El libro de Soriano defiende la concepción unitaria –integrista– de la propiedad y, consecuentemente, se opone radicalmente a los concursos de la legislación valenciana apoyados en las tesis de la propiedad segregada de García-Bellido (Soriano, 1995: 107, 95 y 112-3).

Los planteamientos unitarios de la propiedad defendidos por Soriano y el TDC encontrarían una inesperada pero significativa oposición desde las filas de la Federación de Promotores Inmobiliarios de la Comunidad de Valencia que se opusieron a los planteamientos del TDC (Gaja, 2000: 97). La doctrina conservadora (todo para el propietario de la tierra) chocaba inesperadamente con el empresariado (todo para el propietario de los medios de producción).

En 1996, como primera medida urbanística del nuevo gobierno conservador, ve la luz un decreto que, clarísimamente, hace un paso a favor de los propietarios del suelo, se trata del *Real Decreto-Ley 5/1996, de 7 de junio, de medidas liberalizadoras en materia de suelo y Colegios Profesionales* que, entre otras, elimina la posibilidad de que los nuevos planes generales o sus revisiones clasifiquen suelo como Urbanizable no Programado (SUNP). La interpretación sólo puede ser una, desde la óptica política más conservadora no se quieren concursos que puedan cuestionar la concepción agregada de la propiedad. En los concursos de los PAUs, como ya hemos apuntado, las ofertas ganadoras no tenían por qué ostentar la propiedad del suelo. De hecho la disposición transitoria del mencionado decreto ya abre la posibilidad a prescindir del concurso en suelos ya clasificados como SUNP, justo lo contrario a lo establecido en la LRAU que, por un lado, exige siempre el concurso y, por otro, viene a convertir todo el urbanizable en «no programado» (Rullan, 2012: 183).

Pero la consagración del modelo de propiedad urbanística integrista y agregada se dio en 1998 con la aprobación de la *Ley 6/1998 sobre régimen del suelo y valoraciones*. Dicha consagración se lleva a cabo por dos vías. Por un lado, siguiendo las recomendaciones del informe del TDC de 1993, por la vía del aspecto más conocido y mediático de la ley consistente en sancionar que todo el suelo no protegido es urbanizable (artículo 10) y, por otro, reconociendo el valor de estos suelos no en función de su realidad física anterior a su transformación sino «*por el valor equivalente al beneficio empresarial anticipado de la virtual actuación no desarrollada*» (Fernández, 2011: 80). De necesidad de concurso ni rastro.

Es decir que se permite urbanizar todo el suelo no explícitamente protegido y, además, a sus propietarios se les reconoce el valor urbanístico, agregado, monocéfalo. Los propietarios rurales por ahí ganaban la batalla a los potenciales urbanizadores. Estos planteamientos se verían truncados en 2007 con la aprobación de la *Ley 8/2007 de suelo* que, por un lado, elimina la definición residual del suelo urbanizable y, por otro, reconduce las valoraciones futuras al valor inicial sustentándose sobre las tesis de la concepción de la propiedad desagregada (Fernández, 2011: 113-44).

En 2013 el antiguo TDC, ahora rebautizado como Comisión Nacional de la Competencia (CNC), evacua un tercer informe bajo el título de *Problemas de competencia en el mercado del suelo en España*<sup>11</sup>. En este informe, elaborado en legislatura conservadora, se vuelve a las andadas con la filosofía del «todo urbanizable menos los protegido» al proponer, a modo de recomendación, que se convierta «en suelo apto para ser urbanizado todo el suelo que no deba estar protegido por motivos de interés público convenientemente justificados» (CNC, 2013: 79). Insistencia, por tanto, en las tesis del mismo organismo de 1993 y 1995, como si la burbuja inmobiliaria y su estallido no tuviera nada que ver con haber seguido este consejo desde 1998.

La tabla 1 resume los principales documentos que hemos ido comentado y que, desde finales del siglo pasado, han ido apareciendo en apoyo de los intereses del agente propietario o del agente urbanizador.

Tabla 1  
DOCUMENTOS EN APOYO DEL AGENTE PROPIETARIO O DEL AGENTE URBANIZADOR

Año	Agente al que se defiende	Documentos
1993	Propietario	1r Informe del Tribunal de Defensa de la competencia
	Urbanizador	Publicación de «La liberalización efectiva del mercado del suelo...» de J. García-Bellido
1994	Urbanizador	Aprobación de la LRAU valenciana
	Urbanizador	Informe sobre Suelo y Urbanismo en España (Informe de Salamanca)
1995	Propietario	2º Informe del TDC «La competencia en España: balance y nuevas propuestas
	Propietario	Publicación de «Hacia la tercera desamortización» de J. E. Soriano
1996	Propietario	Supresión del SUNP
1998	Propietario	Ley 6/1998 sobre régimen del suelo y valoraciones
2007	Urbanizador	Ley 8/2007 de suelo
2013	Propietario	3r Informe de la CNC «Problemas de competencia en el mercado del suelo en España»

Fuente: elaboración propia.

<sup>11</sup> <http://www.cncompetencia.es/Inicio/Informes/InformesyEstudiossectoriales/tabid/228/Default.aspx>

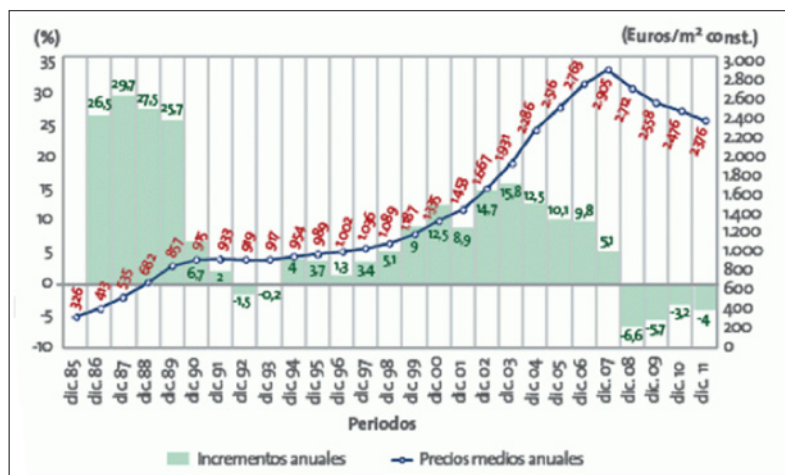
Ninguno de los dos enfoques que aparecen en la tabla 1 consiguieron el objetivo que ambos decían perseguir: controlar el precio de la vivienda para que esta fuera accesible a la mayoría de la población. A fin de cuentas, como han demostrado multitud de estudios empíricos, lo que marca el precio de la vivienda es la capacidad de pago de la demanda. Rebajándole el precio del suelo al promotor, al no tener que abonarle al propietario el valor especulativo expectante que este le exigía antes, lo único que se consigue es que dicho valor especulativo expectante lo capture totalmente el promotor/urbanizador y, por tanto, no repercute en una supuesta disminución del precio de la vivienda.

El agente urbanizador ha acabado con el «privilegio feudal» que permitía al propietario de la tierra incorporar al precio de sus terrenos un componente añadido derivado de las expectativas de revalorización que el plan municipal generaba con la clasificación y calificación del suelo. Este sobre coste, a partir de 1994 en la Comunidad Valenciana y progresivamente en la mayoría de las demás CCAA, el urbanizador se lo ahorrará, no así el comprador de la vivienda que, además de los costes de producción del bien, deberá abonar al promotor lo que este, ahora, no ha tenido que pagar al propietario inicial<sup>12</sup>. La especulación para quien produce el bien, no para el propietario inicial de los terrenos donde se produce.

Tanto las políticas del «todo urbanizable menos lo protegido» implantadas desde 1998, como las que se han instaurado en la mayoría de Comunidades Autónomas desde 1994 han sido inocuas a la hora de contener el precio de la vivienda según constatan los datos de la Sociedad de Tasación (Figura 1)

Figura 1

EVOLUCIÓN DE LOS PRECIOS E INCREMENTOS ANUALES DE LA VIVIENDA NUEVA EN ESPAÑA (1985-2011)



Fuente: <http://www.idealista.com/news/archivo/2012/01/09/0379053-cuanto-ha-subido-en-los-ultimos-26-anos-el-precio-de-la-vivienda-nueva-en-tu-ciudad-tabla>

12 Fernando Gaja estudió el caso de la ciudad de Valencia en 1999. En la ciudad del Turia con unos costes de producción del suelo urbanizado que oscilaban entre 28.582 y las 13.795 pts/m<sup>2</sup>, que ya incluían los beneficios del urbanizador, las transacciones situaron los precios del suelo en valores entre las 50.000 a 60.000 pts/m<sup>2</sup> de la que los propietarios no urbanizadores habían recibido entre 6.162 y 13.148 pts/m<sup>2</sup> del inicial coste de producción (Gaja, 2000: 93).

Ante las evidencias que han constatado el vano empeño de ambas estrategias para, supuestamente, abaratar el precio de la vivienda, hay que buscar las causas de su contante encarecimiento en otros factores que trascienden la pura política urbanística, ahí entra en juego la política financiera.

## 2.2. La financiarización del suelo y su integración en los circuitos globales de capital: evolución de la legislación hipotecaria española

Como ya había ocurrido con la crisis fordista (Harvey, 2005) de la década de 1970, las formas de apropiación de las rentas del suelo empezaron a cambiar como consecuencia, precisamente, del viraje experimentado por el propio sistema de producción fordista. Un viraje animado por la paulatina irrupción de las políticas neoliberales y la financiarización. Como se ha señalado la financiarización es un proceso que consiste en la «*articulación de la renta por medios más financieros que salariales, y la articulación de la economía por medios de valorización más monetaria que productiva*» (Rodríguez, 2013: 1). Paralelamente, en este modelo de acumulación, muchos bienes y servicios que previamente se habían constituido en un régimen de propiedad pública pasan a ser privatizados, transformando "lo que antes eran garantías públicas (...) [en] «*activos*» financieros, con un valor negociable en los mercados globales de capitales" (Madrilonia.org, 2011: 47).

Los activos financieros, como es bien conocido, tienen un valor que no se corresponde con ningún capital real y, por tanto, lo que se comercializa son en realidad las expectativas sobre los beneficios futuros y no su valor productivo. Así, el rentista no es una figura productiva, de manera que se ha construido un modelo económico basado en un valor, por expectante, inexistente.

### 2.2.1. La financiarización y la producción de urbana

Con el capitalismo financiero el suelo se ha convertido en capital ficticio (Harvey, 1982) integrando la renta urbana totalmente en la circulación de capital (García, 2008) y los mercados hipotecarios en los mercados financieros globales. Que el suelo se haya convertido en un activo financiero, implica que lo que se compra y se vende ya no es la tierra en sí misma, sino el derecho expectante, ficticio, a apropiarse de su supuesta renta urbana potencial (Harvey, 1982).

Esta nueva forma de apropiación de la renta urbana se lleva a cabo mediante la compra venta de títulos inmobiliario-financieros: la llamada titulización hipotecaria que se ha desplegado preferentemente sobre las hipotecas inmobiliarias. La titulización es un proceso financiero «*que nace en los desregulados mercados de Estados Unidos, [y] consiste en separar las fases de origen, administración y explotación de los préstamos hipotecarios repartiéndolas entre diferentes entidades*» con la finalidad de «*evitar los riesgos de impagos, además de aumentar la escala de generación de los préstamos hipotecarios*» (López y Rodríguez, 2010: 291-2). Este ha sido uno de los principales mecanismos de la financiarización de la renta urbana en España y se implantó con la promulgación de la Ley 19/1992, de 7 de julio, *sobre Régimen de Sociedades y Fondos de Inversión Inmobiliaria y sobre Fondos de Titulización Hipotecaria*.



De la misma manera que con el resto de títulos financieros, como las acciones o la deuda del Estado, el precio de los títulos inmobiliario-financieros no refleja unos costes de producción más el beneficio empresarial sino el valor que puede tener en el futuro calculado a partir de los que se cree que se puede llegar a pagar por ellos. Un terreno, así, vale tanto como se cree que se puede llegar a pagar por él. Esta es la causa por la que se sigue clasificando y calificando suelo aunque el haya clasificado y calificado no esté consolidado o siga vacante y que España esté a la cabeza de Europa en porcentaje de viviendas secundarias y desocupadas (Naredo, 2003: 142). Así es como se ha desarrollado un modelo acumulación que se ha venido en llamar de base territorial (López y Rodríguez, 2011), un modelo que se sustenta en las revalorizaciones inmobiliarias y que implica continuas inversiones en el circuito secundario ya que cuanto más se invierte, más se revaloriza el suelo y mayor es la renta que sacan los propietarios de los títulos inmobiliarios. De esta manera «*el problema de la especulación adquiere un profundo significado en la dinámica inestable del capitalismo global*» (Harvey, 1982: 349).

Otra de las consecuencias fundamentales del proceso de financiarización del suelo es que a través de estos mecanismos no es necesario ser el propietario del suelo, ni siguiera promotor o urbanizador, para apropiarse de sus rentas. El capitalismo financiero ha transformado los mecanismos de apropiación de las rentas del suelo transformado los roles que juegan cada uno de los agentes del suelo.

### 2.2.2. La implantación de la titulización en el mercado hipotecario español

Hasta los años ochenta, las hipotecas se concedían en España gracias a la financiación de viviendas que llevaban a cabo, por un lado, el Banco Hipotecario español que gestionaba la vivienda de protección oficial y, por todo, las cajas de ahorro de cada territorio que eran las que se ocupaban preferentemente de las viviendas libres (Soler, 2001). Este esquema se truncó durante la primera década de los ochenta con una serie de medidas liberalizadoras que afectaron la política de tipos de interés y equipararon las operaciones que, hasta aquel momento, podían realizar bancos y cajas de ahorros (Jiménez y Sánchez, 2002). Eran los primeros vientos liberalizadores.

La temprana *Ley 2/1981, de 25 de marzo, de regulación del mercado hipotecario* ya tenía como finalidad impulsar el mercado hipotecario con nuevos activos financieros. Su promulgación perseguía financiar la actividad inmobiliaria de un porcentaje mayor de población potencialmente hipotecable para acceder a una vivienda en régimen de propiedad (Jiménez y Sánchez, 2002). Esta ley convirtió rápidamente el mercado hipotecario en uno de los principales motores económicos a la vez que asentaba las bases para una reforma estructural del marco jurídico de este sector. En concreto la *Ley 2/1981* establecía un nuevo paquete de medidas liberalizadoras que Soler (2001) clasifica en cuatro tipos.

En primer lugar, se implantaban medidas que liberalizaban la actividad de las entidades financieras. Estas medidas homogenizan la actividad de bancos, cajas de ahorro y cooperativas de crédito permitiéndoles la libre participación en todos los mercados, tanto de créditos como de depósitos. Además, se eliminaban las restricciones geográficas a las actividades financieras a fin y efecto de permitir y fomentar la expansión de todas las entidades. Esto último fue especialmente importante para la expansión, más allá de sus territorios originales, de las Cajas de Ahorros.

En segundo lugar, se instrumentalizaban los diferentes títulos financieros (cédulas hipotecarias, bonos hipotecarios y participaciones hipotecarias) que posteriormente se han agrupado en forma de Fondos de Inversión Inmobiliaria y Fondos de Titulación Hipotecaria (Ferraz, 2002). Es cuando se instrumentalizaron también las sociedades de inversión colectiva. Unos instrumentos que se conformarían como básicos para el posterior crecimiento del negocio financiero.

En tercer lugar, se liberalizaban los tipos de interés implantando el interés variable en las operaciones bancarias. Con lo que se transfería el riesgo del préstamo desde el prestamista, la entidad financiera, al deudor, ya fuera este particular o promotor.

Y, en cuarto lugar, se aplicaron medidas para promover la vivienda en régimen de propiedad. Entre estas medidas destacan las subvenciones a promotores y las desgravaciones fiscales a particulares que accedían a una vivienda en propiedad (Soler, 2001).

Estos tipos de medidas iban preparando la economía española para su plena inserción en el emergente modelo neoliberal europeo ya desde antes de la integración. Así, a principios de la década de los noventa, cuando España ya había entrado en la Comunidad Económica Europea, se instituía plenamente la llamada titulación hipotecaria a través de la ya citada *Ley 19/1992, de 7 de julio, sobre régimen de sociedades y Fondos de Inversión Inmobiliaria y sobre Fondos de Titulación Hipotecaria*. Como se ha expuesto más arriba, la titulación es un proceso financiero que consiste en transformar cualquier activo no negociable susceptible de generar ingresos, como los préstamos hipotecarios, en valores negociables. Con ello las hipotecas entraban, convenientemente empaquetadas con productos de variada calidad, en el mercado de valores (Jiménez y Sánchez, 2002). De esta manera el mercado hipotecario español quedaba inserto en los circuitos financieros internacionales, incrementando notablemente sus posibilidades de crecimiento y su riesgo, un cambio muy importante en la función del crédito de la sociedad de consumo (López y Rodríguez, 2010). En este sentido, si en el fordismo el crédito era una forma de financiación que iba ligada al crecimiento de los salarios y a un ritmo de endeudamiento superior al de los salarios, con esta nueva fórmula el crédito entraba en una nueva fase histórica: «*el crédito ya no era opcional*» (López y Rodríguez, 2010: 285) sino imprescindible para consumir. De hecho, con el descenso del crecimiento de salarios, el crédito se convirtió en la principal puerta de acceso al consumo. En otras palabras, el sistema financiero español había alcanzado su fase postfordista (López y Rodríguez, 2010).

A partir de 1994, tras el Tratado de Maastrich y la consolidación de la Unión Económica y Monetaria Europea, en España se promovieron nuevas medidas que favorecieron la expansión del crédito hipotecario. Así, por ejemplo, la *Ley 2/1994, de 30 de marzo, sobre subrogación de préstamos hipotecarios*, reducía considerablemente el coste de cambio de hipoteca y el *Real Decreto 2616/1996, de 20 de Diciembre, por el que se modifican los Reales decretos 1426/1989 y 1427/1989, de 17 de Noviembre, sobre aranceles de los Notarios y de los Registradores de la Propiedad en las Operaciones de subrogacion y Novacion de Préstamos hipotecarios acogidas a la Ley 2/1994, de 30 de Marzo* reducía los aranceles de notarios y registradores de la propiedad (Soler, 2001). Con un mercado hipotecario cada vez más amplio y flexible, fruto de la aplicación de toda esta nueva legislación, las entidades de crédito fueron destinando progresivamente una mayor parte de sus préstamos a la financiación de la vivienda y la promoción inmobiliaria lo que provocó la deriva de la legislación urbanística hacia los planteamientos neoliberales expuestos más arriba.

En 2007 se aprobaba la *Ley 41/2007, de 7 de diciembre, por la que se modifica la Ley 2/1981, de 25 de marzo, de Regulación del Mercado Hipotecario y otras normas del sistema hipotecario y financiero, de regulación de las hipotecas inversas y el seguro de dependencia y por la que se establece determinada norma tributaria*. El preámbulo de la misma se reconoce sin disimulos que la financiación de la vivienda representaba «*alrededor de dos terceras partes del valor de la riqueza total de los hogares del estado, y que al mismo tiempo esta financiación depende del mercado hipotecario*», al tiempo que era uno de los «*segmentos del sistema financiero con mayor influencia sobre la estabilidad macroeconómica y financiera*». Es decir, que gracias a los créditos que habían concedido las entidades financieras dos terceras partes del patrimonio de las familias era deuda y que este endeudamiento era en el que se basaba la estabilidad de la economía financiera. La misma disposición también argumenta que, al mismo tiempo, «*el crédito hipotecario tiene un gran peso en el balance de las entidades de crédito y supone más de la mitad del total del crédito al sector privado residente*». En otras palabras, el endeudamiento que suponía el acceso a la vivienda representaba más del 50% del negocio de las entidades financieras. La ley también aclaraba que la intencionalidad de la normativa era la «*consolidación del crecimiento de los títulos hipotecarios y la eliminación de los obstáculos a la oferta de nuevos productos*», lo que significaría un nuevo impulso para el endeudamiento de la población y para la acumulación de capital ficticio en las entidades financieras gracias a la política fomentada de acceso a la vivienda en propiedad

En 2008 el *Real Decreto Ley 2/2008, de 21 de abril, de medidas de impulso a la actividad económica*, permitió aumentar hasta 3.000 millones de euros la dotación máxima para el otorgamiento de avales del Estado a bonos de titulización. Con esta medida se profundizaba todavía más en la promoción de este tipo de activos, un objetivo reconocido en el Preámbulo del Real Decreto aprobado por el gobierno, ahora socialista.

Ni la crisis de 2007 ha parado los productos fundamentados en la titularización aunque el estallido de la burbuja financiera «*puso al descubierto (...) deficiencias importantes en la gestión del crédito por parte de las entidades, en las prácticas titulizadoras, en los servicios de calificación del crédito, en el comportamiento de los inversores y, también, en la actuación de algunos supervisores*» (Martín, 2012: 11). Pero, incluso desde que estalló la crisis, la titularización ha seguido acaparando la actividad financiera de la banca, ya que aunque se ha paralizado en gran parte la colocación de titulizaciones entre los inversores privados, «*el impacto sobre la actividad emisora ha sido menor, debido a que los originadores, esencialmente, las entidades de crédito, pudieron utilizar las titulizaciones de sus propios activos como garantía para obtener liquidez por parte de los bancos centrales*» (Martín, 2012: 13).

Ante este importante vendaval financiero la política urbanística difícilmente se ha podido resistir al desvío hacia la senda neoliberal, ya fuera permitiendo urbanizar a iniciativa de los propietarios todo lo no protegido, ya fuera permitiendo urbanizar todo lo clasificado a los promotores saltando por encima de la propiedad. El dinero prestado, aunque ficticio, inundó el suelo y la política urbanística se limitó a encauzar las riadas, bien con planes que defendían los intereses de los propietarios, bien con planes que defendían los de los promotores.

### III. CONCLUSIONES

Los mecanismos capitalistas clásicos de apropiación de la renta del suelo en España se han transformado de forma radical.

Desde la ciencia urbanística se ha atendido más a los cambios en el tradicional Sistema Urbanístico Español que a los acontecidos en el sistema financiero. Pero analizando la cronología de ambos tipos de disposiciones se ve claramente como han sido las reformas de liberalización financiera las que han llevado la iniciativa y, directamente, han provocado la deriva del Sistema Urbanístico Español hacia planteamientos de cuño neoliberal. La regulación neoliberal del sistema hipotecario ve la luz con una ley aprobada en 1981 y a la titularización se le da luz verde en 1992, un año antes de que aparecieran los primeros estudios e informes a favor de las diferentes vías a la liberalización urbanística y dos antes de la aprobación de la primera ley urbanística liberalizadora, la LRAU Valenciana, en una de las 17 comunidades autónomas. Han sido los planteamientos económico-financieros neoliberales de los 80s y los 90s los que han arrastrado al urbanismo por la senda neoliberal.

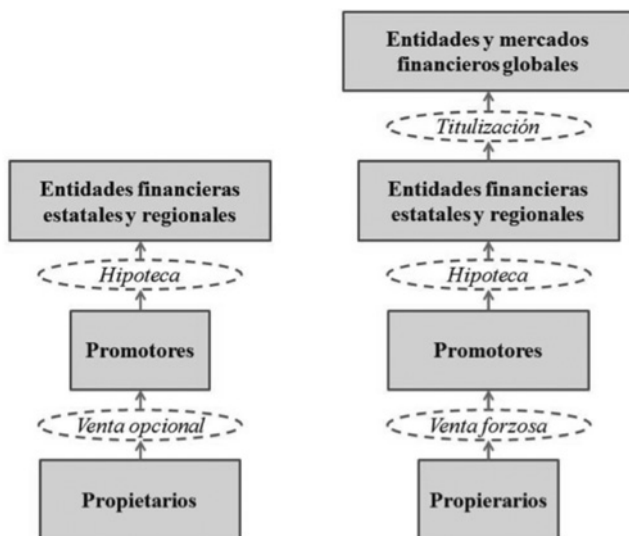
La adaptación de los mecanismos de producción/apropiación de la renta urbana en España al nuevo régimen neoliberal de acumulación se ha llevado a cabo en dos frentes diferentes pero complementarios, el financiero y el urbanístico. El primero ha liberalizado las actividades financieras instituyendo nuevos mecanismos como la titulización que han permitido el incremento del flujo hipotecario por encima de las posibilidades de la economía real o productiva. El segundo ha liberalizado el urbanismo en dos líneas no contrapuestas: posibilitando la urbanización de todos los espacios no protegidos y abriendo la puerta a la venta forzosa de terrenos a favor de los promotores ganadores de los correspondientes concursos.

El papel de los agentes que intervienen en el proceso de producción y apropiación de la renta urbana, a raíz de los cambios financieros y urbanísticos operados en España, han cambiado tal como se dibuja en las dos columnas de la figura 2. En ella el área de los rectángulos que representan a los agentes se dibujan en distintos tamaños que, indicativamente, refleja el dominio de unos sobre otros y, en consecuencia, la cantidad de renta urbana que cada uno de ellos consigue apoderarse. El tipo de relación mercantil que se establece, desde los propietarios iniciales de los terrenos hasta las entidades financieras, se representa por óvalos de trazo discontinuo.

En el modelo fordista (figura 2, columna izquierda) los propietarios, al tener la venta de sus terrenos como una cuestión opcional, están en una posición en la que pueden exigir a los promotores parte de la renta urbana que se genera con la producción de ciudad. Ello supone que, eventualmente, pueden obtener un porcentaje mayor de tal renta o, como mínimo, una forma de obtenerla sin los riesgos de la promoción. La promoción, por su parte, acudía a las entidades financieras de su territorio que disponían de una capacidad de préstamo directamente condicionados por las cuantías de los depósitos de sus clientes que, en su mayoría, eran de su entorno regional.

El modelo neoliberal (figura 2, columna derecha) incorpora dos novedades importantes con respecto a su antecesor fordista, una urbanística y otra financiera. Por un lado la relación entre propietarios y promotores ya no se establece sobre la venta opcional sino forzosa y en la que el precio lo propone el promotor en el concurso. Por otro lado aparece la gran novedad de la titulización de las hipotecas previamente firmadas por promotores y particulares lo que

Figura 2  
EL MODELO FORDISTA Y NEOLIBERAL DE APROPIACIÓN DE LA RENTA DEL SUELO EN ESPAÑA



Fuente: Elaboración propia.

conecta directamente el sistema con los mercados financieros globales y, de esta manera, aporta la financiación que las entidades financieras regionales no podían proporcionar.

En este sentido se va desvaneciendo la disputa que había en el fordismo por las rentas del suelo entre propietarios y promotores. Ya no se puede hablar entonces de una clase social de propietarios urbanos, sino de grupos de poder o *lobbies* oligárquicos urbanísticos. Unos grupos empresariales que, con esta transformación, se han convertido en actores dominantes en el actual proceso de producción/apropiación de rentas urbanas. Esto conlleva además que quienes controlan el mercado inmobiliario pasan a ejercer un papel activo en la creación de las condiciones que les permitan intensificar sus futuras rentas mediante políticas tendentes a la recalificación y revalorización de urbanística. Da igual que la propiedad del suelo esté en manos de propietarios o de promotores/urbanizadores, lo importante y decisivo es tener el título de la hipoteca que hace posible la urbanización o la compra de la vivienda.

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# **ARTICLES**

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# INDICATORS OF TOURISTIC SUSTAINABILITY APPLIED TO THE INDUSTRIAL AND MINING HERITAGE: EVALUATION OF RESULTS IN SOME CASE STUDIES

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## I. INTRODUCTION

Areas with a productive tradition have found a stimulus in tourism for the reassessment of their distinguishing features based as much on material cultural aspects as on non-material ones. This form of tourism has little to do with the usual criteria imposed in other areas, where a significant conglomeration of people is experienced at certain times of the year. The patrimony inherited from industry and mining is a cultural resource which, in effect, contributes towards *de-seasoning* the touristic demand and diversifying attractions to the benefit of the various destinations.

Understanding the diversity of existing cases, the main objective is to approach the level of sustainability reached with the new touristic use. As the industrial and mining heritage are frequently interpreted as a local revitalising resource, searching for and selecting the most adequate indicators has become indispensable, setting the foundations of the planning and the actions undertaken.

Another objective has been to compare the starting point of the selected areas with that reached in recent times before the expectations created by cultural tourism. This has enabled the problems of initial decline to be overcome and better levels of development and welfare to be brought about.

## II. CONCEPTUAL AND METHODOLOGICAL CONTRIBUTION

In this study, the qualitative and quantitative methodological perspectives have been combined. The conceptual approximation has been based on the bibliographical checking of theories linked to research, not only focusing on the transcendence of sustainable tourism

but also on the details of sustainability in the area of industrial and mining heritage. This is a novel contribution which has not been seriously analysed yet and which attempts to highlight the fulfillment of a number of indicators in areas selected for their cultural and touristic significance, while at the same time defining the concept of sustainable tourism and industrial heritage.

Cartographic and photographic documents have been used, field work has been carried out and a type of survey has been devised for the analysis of the case studies. The area of analysis is centred on some places that are representative of what this type of tourism currently means, creating a model of local evaluation that serves as a projection for future touristic developments in more ample geographical areas. The analysed areas are in Asturias, País Vasco, Cataluña, Aragón, Castilla-La Mancha, Murcia and Andalucía.

Twenty-three specific indicators have been established that are grouped into four general components referring to the efficient and integrated management of natural and cultural resources: the maximisation of social, economic, cultural and environmental benefits for the local community.

Moreover, a synthetic index of sustainable development (SISD) has been designed which is calculated as an average of the figures reached in the four components of each selected area. In addition, using an index, the correlation between the number of tourist visits and sustainability has also been calculated.

### **III. THEORETICAL BASIS OF THE RESEARCH**

Sustainability is a way of achieving local development. The basic element to protect the values connected with patrimony is the balance between its use and its preservation. Co-ordination between the various government administrations, the promotion of private initiative and the promotion of the sustainable use of patrimonial wealth should be absolute objectives. Similarly indispensable is the application of management projects that are integrated into urban, regional, touristic and cultural policies, as well as into the economy and the society of the receiving areas.

Some threads appear in the study which interpret tourism in the context of ecological and environmental sustainability (geographical and human), not neglecting the economic perspective, and in the context of the long-term viability of the projects. Other threads can be included with ones already mentioned eg. political, governmental and administrative, which explains the different interpretations of the concept of sustainability and its subsequent application to the area of tourism. On many occasions, sustainable tourism has been understood only as lasting form of tourism, instead of referring to the viability of the activity while causing no damage to the environment.

### **IV. TOURISTIC DIMENSION AND LOCAL MANAGEMENT OF THE INDUSTRIAL HERITAGE**

All the selected areas enjoy a valuable patrimony, inherited from a brilliant industrial or mining past and later given a new lease of life by tourism. The mining areas are more spectacular than the industrial ones for the fact of having suffered more greatly from the deteriorating landscape as well as having been places of recovery with more daring projects and integrated



into areas of little or no touristic tradition. The results have been spectacular and it has been possible to successfully transform old patrimonial resources into products for tourism.

In the four mining areas that were selected (Almadén, Riotinto, Cartagena-La Unión and Andorra-Sierra de Arcos) mining parks have been created, i.e. theme areas that, firstly, demonstrate the type of activities undertaken for decades or centuries by means of education, enjoyment and research. Secondly, they also manage to protect the patrimony inherited from mining work in its geographical environment. Mining parks like these have become important tourist attractions, capable of generating jobs and income, lessening the deterioration that would have been caused by the long-term closure of the operations and their various facilities.

Various projects have been undertaken in these areas but in all cases, a basic reference point has been the offer of touristic-cultural services of the park, from the underground gallery tours or the overground open areas to the on-site museum visits or the mineral treatment facilities.

In the industrial areas analysed, (River Parks of Llobregat and Ter, La Encartada factory in Balmaseda and Duro-Felguera in Langreo) the impact of the projects has been less significant because of the actual characteristics of the overhauled structures. Industrial museums have been opened where the buildings and original tools of production have been preserved, recreating the pre-closure atmosphere. In addition, interpretation centres have been opened where the main aspects of the industrial zone and its surrounding area are explained to the visitor using modern media methods.

The conversion of industrial patrimony into a cultural resource and a touristic product demands, in almost all cases, the intervention of public initiatives destined to finance the cost of the undertakings. The town halls, although they have not always taken on the complete preservation of the remains, have been the true architects of the change towards tourism by applying central or regional government initiatives and by making use of technical ability to provide a tourism impulse to unproductive areas through planning. Similarly significant is their participation in the foundations and boards responsible for the development, management and exploitation of the old buildings and their surroundings. In other cases, it is the commitment of the holding companies, which has occurred in some mining areas and which has been the determining factor in facilitating the work of touristic adaptation.

The conversion into patrimony of the architectural remains demands the participation of various agents: the local community, government administration at its various levels and industrial or mining companies. Each one of these plays a fundamental role in the touristic impulse of the areas and in the final success of the projects. Ideally, the three above-mentioned agents work together and actively intervene from the start, which guarantees the new experience of local development. However, what usually happens is that the initiative is only taken by some of the agents mentioned.

The individual characteristics of each area determine, somehow, the ways of intervention and the level of participation of government administration, the local community and the companies in the various stages. The success of the analysed projects, which are Spanish models of the best management of industrial heritage, goes beyond any partial consideration and confirms the importance of a comprehensive action plan and the commitment of public and private agents.

## V. COMPONENTS AND INDICATORS OF SUSTAINABILITY: EVALUATION OF RESULTS

By means of a postal survey sent to the selected centres between December 2011 and January 2012, the necessary information has been obtained to measure the touristic sustainability related to industrial heritage, referring to the components as previously established indicators. Using the average values, the synthetic index of sustainable development (SISD) of each patrimonial area has been calculated.

### a) Almadén Mining Park

It presents a medium- high value on the SISD. Of the four components, the environmental one has the highest value, followed by culture and management. Sustainability related to the social and economic areas is less than average.

### b) Riotinto Mining Park

It is in first place regarding the synthetic index of sustainability. All of the described components present values that are higher than the rest, above all cultural followed by social and economic. The environmental aspect has the lowest value but it is still above average.

### c) La Unión Mining Park

This has a medium-high value on the SISD. The component with the highest number is the cultural one followed by social and economic. The environmental component is the one with the lowest value although it is higher than the general average.

### d) Colonia Vidal Museum

This has a medium-low value on the SISD. The most noteworthy component is the environmental one, which is above average. This is followed by cultural, social and economic. That of management is one of the lowest in the whole group.

### e) Boinas La Encartada Museum

This occupies third position in the index of sustainability. The environmental component stands out above all, followed by the cultural, the social and the economic. That of management comes out lowest.

### f) Iron and Steel Industry Museum

Its SISD has a medium-low rating. The areas with highest rating are the social, the economic and the cultural. The environmental area is seriously deficient, with the lowest rating of the series.

#### g) Technological Mining Park of Andorra-Sierra de Arcos

This Park has a low value SISD. The strongest aspects are the cultural and environmental followed by the social and economic. That of management is particularly deficient.

To see the connection between the index of sustainability and the number of visitors, a co-relational coefficient has been calculated that responds to both variables, and whose value can be found between -1.0 (perfect inverse relationship) and 1.0 (perfect direct relationship). The coefficient calculated is 0.688, which indicates high positive correlation.

## **VI. CONCLUSIONS**

All the projects undertaken have taken into account the basic aspects of sustainability, above all in the cultural, environmental and socioeconomic areas. That of management presents low values. In heritage centres, sustainability is more important in Riotinto Mining Park, with greater experience in use for tourists, which confirms that sustainability is related to medium and long term projects.

There is a direct connection between this tourism and sustainability, with an important positive correlation. Therefore, the sustainable measures have meant a lot for the increase in tourist visits to the selected places. Sustainability has been the basis for all the interventions undertaken and it has created a kind of harmony which associates, not without problems, tourism and local development.



# HOW TEENS APPROPRIATE PUBLIC SPACE: ANOTHER VIEW OF URBAN RENEWAL IN BARCELONA

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The geographies of childhood and youth are evolving towards the goal of including the diversity of experiences and needs of those individuals who have traditionally been excluded from geographic studies because of their age, gender, sexuality, ethnicity, class, or disability (Aitken, 1994, 2001; Holloway and Valentine, 2000; McKendrick, 2000; Ortiz, 2007; Prats, 2010; Rodó de Zárate, 2010). Numerous topics have been explored over the years, leaving an important legacy of research emphasizing capacity of boys, girls, and young people to take action in various aspects of the geographic realm (Mathews, 2003; Katz, 2006; Holloway, Brown and Pimlott-Wilson, 2011).

Many studies have been published on the relationship between youth and urban public space, emphasizing the importance of the streets as a place of autonomy, of constructing personal and collective identity (Gough and Franch, 2005) and friendships (Bunnell et al., 2011), or of confronting the controls imposed on young people by adults (Mattews, Taylor, Percy-Smith and Limb, 2000). Public space is unsupervised and offers the freedom to meet other people in ways that are not controlled by adults, or at least not to the same extent as they would be within the home environment. At the same time, this supposed freedom collides with the «adultification» of public space, or with the fact that urban public space is constructed by and for adults, and is assumed to be an adult public space (Driskell, Fox and Kudva, 2008). This assumption, added to the adult notion of young people as needing protection and/or as a potential threat, leads to the youth being excluded from public spaces, or at least not always being welcomed (Rodó, 2010). Nonetheless, the streets and public spaces in general have a fundamental role for youth as a place to learn and to construct their sense of self (Holloway, Hubbard, Jöns and Pimlott-Wilson, 2010).

Adolescents are situated somewhere between childhood and young adulthood. An adolescent can be a child, a youth, an adult, or in between any of these categories. It is a transitional

phase, necessary and confusing, during which each person continually debates between wanting to hold on to the protection received as a boy or girl and the desire to begin to exercise the rights that belong to adults. In addition to age, what perhaps best identify an adolescent is increased independence and the fact of being less monitored by adult family members, both at home and away from home (Weller, 2006). In our context, the passage from primary to secondary education at age 12 is a major step toward achieving greater autonomy. In many cases, it means a change of schools and a new education model that involves less supervision. Cahill (2000) advocates for the study of adolescence because it is a life-stage that encompasses the primary rites of passage for young people (first real responsibilities, first work experiences, first sexual experiences...) and the first independent, everyday uses of public space, unaccompanied by any adult. The same author created the concept of 'street literacy' or an interpretive framework that gives preference to informal, local knowledge that is based on personal experiences in a specific context, the urban public space. According to the author, the environment, and the street in particular, is a meaningful context in which to learn how to explore the relationships of young people with neighborhoods. In this context, adolescents have great knowledge of the protocols of their surroundings and acquire environmental skills that help them negotiate their neighborhoods, which they have learned from their experiences with fathers, mothers, other adults, and other young people (Cahill, 2000).

This article presents the ways that 14- and 15-year-old adolescents living in Barcelona's Besós-Maresme neighborhood carry on their daily lives, particularly how they use their time and space in their everyday surroundings. Given that their studies are their primary activity, taking place at their school and occupying the major part of their weekdays, we analyzed their activities and experiences outside of the school day and buildings. We asked ourselves what the neighborhood and the city offers for adolescents, what they utilize, and how. We considered the adolescents of Besós as a social group constructed by age but also by specific social relationships and by interactions with culture, politics, and institutional structures and policies at the time the study was undertaken.

We begin with a description of the study area, the Besós-Maresme neighborhood of Barcelona, and the methodology used, and then present the primary results of the study. Finally, we summarize the most important conclusions and suggest ideas for future research.

## **BESÓS-MARESME: A BARCELONA NEIGHBORHOOD**

The study area has a population of 24,403 and an area of 1.3 km<sup>2</sup>. The age structure of the population is close to the average for the city of Barcelona, with 12.5% of the population younger than 14 years and 18.3% older than 65 years. The significant foreign-born population (28.8%) is more than 10 percentage points higher than the city as a whole (18.1%) (Ajuntament de Barcelona, 2010). The Besós-Maresme neighborhood is one of the poorest in Barcelona, according to the most recent data on family income per capita (Recio, 2008).

Located in the northeastern part of the city, in the District of Sant Martí, the hyphenated Besós-Maresme neighborhood is considered one statistical and administrative unit. Besós and Maresme are divided by the *Rambla Prim*, or Thin Boulevard, and have very different origins. Besós was built with public funds on agricultural land in the 1950s and 1960s, to address the need for housing as large numbers of people immigrated to Barcelona, primarily



from the south of Spain. During the early years, the lack of urban amenities, services, and facilities (schools, health care centers, green spaces, public transportation) and the poor quality of the construction materials used to build apartment buildings had a very negative influence on the neighborhood's quality of life. As in other neighborhoods around the periphery of Barcelona, improvements began to be made, slowly but surely, as a result of the neighbors' protests and demands. While Besós was constructed as a public initiative, Maresme was launched as a private initiative between 1954 and 1964, taking advantage of the great demand for immigrant housing. Apartments were built up on fields surrounding about a hundred small houses built in the 1920s (Alberch, 2000).

In recent decades, Besós-Maresme has undergone spectacular urban transformations. A great sporting event, the 1992 Summer Olympic Games, served as the excuse to transform part of the eastern boundary of the city with the creation of the *Vila Olímpica* (Olympic Village) neighborhood and the improvement of the public beaches. Another event, in this case cultural, was the 2004 *Fórum Universal de les Cultures* (Universal Forum of Cultures), which continued the transformation toward the east and created another new neighborhood, *Diagonal Mar* (Diagonal to the Sea). The entire area was revitalized. This new neighborhood is adjacent to Besós-Maresme, placing older apartment buildings next to skyscrapers and luxury hotels. The neighborhood has also incorporated the Diagonal Mar park into its landscape (designed by the architects Enric Miralles and Benedetta Tagliabue), the Diagonal Mar shopping center, and the public spaces of the Fórum, all built at the beginning of the 21<sup>st</sup> century.

Nonetheless, and as Borja (2010) pointed out, while the construction of the Vila Olímpica did not cause any problems for its integration with the city or any negative social reaction, the Diagonal Mar and Fórum projects caused debates. They represented a break with the «democratic» urban renewal that had occurred up until that point and produced a mixture of social and functional spaces. Diagonal Mar was strongly criticized by neighborhood and professional groups because it was a project «based on isolated towers, with no continuity of construction» and with open spaces «open to nothing», of limited use to average citizens (Borja, 2010: 99). The Fórum was not a particularly successful event, although it did permit the construction of a large public space in a long-ignored part of the city. Borja describes the project as debatable, but considers it a «brave decision» to take advantage of the option to create an area with a new «centrality» (mostly high-status hotels and office buildings) in a marginal zone.

These initiatives – the neighborhood of Diagonal Mar and the Fórum – can only be considered «worth the trouble» when the new fabric has become integrated into the weave of the older, popular and industrial neighborhood of Besós-Maresme. And these areas that are so sociologically and urbanistically different can only become articulated when the urban quality of the Besós-Maresme neighborhood has improved substantially. In 2009, within the «Neighborhoods Law», Besós-Maresme was selected to receive government assistance from the 2008-2012 budget allocation for renovation of the worst living quarters and of public spaces, the installation of more public facilities, and the launch of social services programs and stimuli for commercial development.

In this urban context of great contrasts, the boys and girls of Besós-Maresme live their lives. The integration between the old neighborhood and new construction that urbanists consider essential for the success of these urban interventions emerges as a daily practice on

the part of the new generations. We would point out here that our research drew the neighborhood boundaries as they defined them; we did not adopt the administrative boundaries of the Besós-Maresme neighborhood.

## **A QUALITATIVE AND INCLUSIVE METHODOLOGICAL APPROACH**

The fieldwork was conducted in 2010 and 2011 in a public secondary school in the Besós-Maresme neighborhood of Barcelona with students aged 14 and 15 years. To encourage participation, approach the students using different lenses, and give them the opportunity to express themselves in different ways (written, oral, and visual), we used three distinct qualitative techniques: discussion groups, semi-structured interviews, and participative walks through the neighborhood. The first two techniques were used in classrooms provided by the school and the third took place outdoors in the Besós-Maresme neighborhood. The fieldwork took place during study weeks (non-instructional time) and our research activities were included as cultural activities in the school's programming. In addition to several exploratory visits in the neighborhood, we interviewed teachers, the presidents of the Besós and Maresme neighborhood associations, and a representative of the neighborhood civic center, all with the goal of better understanding the urban and social context of the neighborhood's adolescents.

## **APPROPRIATION AND DAILY USE OF PUBLIC SPACES**

The study of daily life and the relationship between people and the spaces where they live is a broad and cross-cutting topic that crosses many dimensions of time and space: education, family, friends, neighborhood, identity, sense of place, etc. The daily life of the adolescents in the spaces of the Besós-Maresme neighborhood of Barcelona may not be very different from that in other working-class neighborhoods of Barcelona or any other part of Spain. At the same time, we could say that it is a unique life experience because these everyday lives take place in a specific geographic context, characterized by recent major urbanistic transformations that generate new opportunities and new spaces.

The results of our fieldwork describe and analyze the neighborhood places that take on importance in the daily lives of adolescent boys and girls, contributing to their social inclusion and quality of life. These places are important because they are where daily activities occur and they are preferred or avoided for various reasons. This is the panorama we will attempt to outline in this section.

Before we review and analyze the spaces and locations identified in the neighborhood by the adolescents, it could be useful to highlight the marked gender differences observed in the type of daily activities that boys and girls participated in. One of the clear differences was interest and participation in sports. These activities, particularly soccer, emerged repeatedly in the discourse of both boys and girls. There was a certain consensus that sports and specifically soccer were predominantly masculine activities.

Of the preferred public spaces (or spaces used by the public), the most frequented and most appreciated by both boys and girls in the Besós-Maresme neighborhood and the Diagonal Mar shopping center, Diagonal Mar park, Fórum spaces, and the beach. Although the

Rambla Prim or Rambla del Poblenou boulevards were mentioned occasionally, the most often cited and used are the re-urbanized spaces with modern design and new construction in and around the neighborhood.

The overall adolescent assessment of the urbanistic changes in the neighborhood and surrounding area is positive; they have increased their sense of belonging to the neighborhood. They not only recognize that their daily surroundings have improved thanks to these changes, but also that their use of space and their opportunities have been expanded by these improvements and by the appearance of new spaces in and around the neighborhood. This is a positive effect that, while not a primary objective of the urban developers, is a good example of the active role that adolescents and young adults undoubtedly play in the processes of appropriation of their surroundings.

The other side of the coin consists of the spaces considered unfriendly or unpleasant (for environmental reasons, such as the water treatment facility) or spaces that they reject and avoid, even though they exist within the same urban frame. Talking about the neighborhood in general, we saw that they reported feeling comfortable everywhere precisely because «it's their neighborhood», they tended to agree on certain important exceptions. A clear example that came up in interviews as well as discussion groups is the area of *la Mina* (the Mine) as well as some narrow –or too open– streets that made them feel insecure. In these cases a clear gender difference was observed, as well as the ways adolescents have learned to negotiate their fears and their surroundings.

It seems important to point out how the significance attached to a public space can change based on the experiences that occur there and the emotions that are associated with them. We observed how a popular and preferred space became rejected after an attack occurred there, or if groups perceived as unfriendly or threatening appropriated the space. On the other hand, the girls felt «watched» in the public space. They are aware that their bodies are considered a sexual object and the discomfort, insecurity or fear this observation from afar causes them has a restrictive effect on their daily use of the space. This provides an obvious example of the extent to which patriarchal structure affects adolescents in the public space.

The cited examples show that despite the generally positive view of their neighborhood, its transformations by urban projects, and its public spaces, there is still room for improvement, for creating new spaces that can fill unmet needs and offer opportunities for certain groups that still have difficulty finding their place or sharing it with others. This is not only a task that remains to be done from the physical construction point of view, but also requires our attention to avoid slipping backwards, so that city spaces can be lived in a safe and healthy and especially egalitarian manner. All citizens have a right to their city, regardless of their age, sex or place of origin.

## **FINAL REFLECTIONS**

This article reflects the authors' desire to show the strength and persistence of focusing on the geographies of childhood and youth at the international level, contributing to this innovative focus with a case study from our context that complements and contrasts with the reality of countries that are more often studied.

The focus on age and the use of qualitative methods directly engages local informants who are often ignored, even in urbanism that takes citizens and social movements into consideration. Adolescents have opinions about their surroundings and make their own demands. Research that involves them also brings into view an interesting conceptual approach, the definition of «their» neighborhood, which has no reason to coincide with administrative boundaries or with the meaning(s) assigned to the neighborhood by the adults of the same community.

The group of adolescents we studied live in a traditionally peripheral neighborhood that in recent years has undergone major urbanistic changes that have produced important physical and social changes. Despite the conflicts that arose at first, these changes have improved the quality of life for these adolescents, the environmental quality of Besós-Maresme, and the feeling of belonging to the neighborhood and to the city. Public space is central to the daily life of adolescents, and during this vital life-stage constitutes a refuge for their interactions and activities.

The interests and activities of adolescents during their free time coincided with the observations of previous studies: they all showed a clear preference for spacious new construction and modern design, a sharp contrast with the older, densely placed buildings where they live. They also prefer these spaces for what they can do there, and because their families and other neighbors are less likely to frequent them. This gives them peace and privacy that they do not find in their immediate surroundings. Although age is to a large extent a homogenizing factor in the urban life of adolescents, the specific experience of public space is not neutral with respect to gender. Girls, per and because of their assigned roles, reveal particular interactions with places that become translated into a more restricted use of the public space.

Public space is a product of the society, and therefore of the adolescents who live there. Their daily use and appropriation of new public spaces are an exercise in citizenship as they express, negotiate, and represent their identity. Therefore, their experience and assessment is very important, both for the evaluation of completed urbanistic projects and for the designs of the future.

# SENSITIVITY OF THE CALCULATION OF LOCAL MEAN SEA LEVELS TO THE USE OF DIFFERENT PERIODS AND METHODS OF TIME SERIES ANALYSIS IN INUNDATION STUDIES IN VALDELAGRANA (CÁDIZ)

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## I. INTRODUCTION

In the last decade, the concern about the effects of the sea level rise as a result of climate change has been accepted not only by the scientific community, but also by governments and international institutions, multiplying the works that have attempted to assess the consequences of such increase in all types of coasts in the world (e.g. IPCC 2007; EEA 2010). Some of these institutions (e.g. International Panel on Climate Change, IPCC 2007; European Environmental Agency, EEA 2010) have encouraged the development of analysis at regional and local scales in order to evaluate and assess the effects of the sea level rise on different coastal areas of the planet.

Even there have been many approaches, most of the works (Titus y Richmann, 2000, Marfai y King, 2005, Zhang, 2011, Fraile et al. 2012a) coincide in considering as inundated those areas of a DEM which height are under a marine inundation local level. This level is usually calculated as the integration of a few variables as the future sea level rise (from climate change numeric models), the tide and the topographic datum. In summarize, most of the techniques agree in the necessity of modeling two surfaces: i) a topographic surface (generally known by means of a DEM), which often is referred to an official altimetry datum

(NMMA in Spain); and ii) a sea surface, the local mean sea level (NMML), which is defined as the vertical difference between a local sea level (generally an averaged value) and NMMA level. Tide gauges are often used to calculate NMML.

NMMA is the altimetry reference (0 m level) in the topographic maps and DEMs in Spain. Nevertheless, this value does not necessarily match with NMML. This discrepancy makes differences in the calculation of marine inundation local levels. It might involve significant difference in the calculation of inundated areas.

Although different approaches to calculate NMML have been used (Wyrski y Mitchum, 1990; Woodworth et. al, 1999; Woodworth et. al, 2009), none of them studied the importance of the period and the method to calculate it.

## II. OBJETIVES AND STUDY AREA

The aim, of this work is to evaluate the sensitivity of the studies of inundated areas to the use of different methods and periods in the calculation of the local mean sea level.

The study area is located in the beach and marshes of Valdelagrana, between the beach and the right shore of San Pedro river. It was chosen three factors: i) there is a tide gauge (Cádiz) closer than 5 km, what means that its registers (trends, time variability) can be assumed for this area without spatial interpolation processes; ii) the tide gauge has a high sea level trend, a necessary condition for this study to maximize the differences between time periods; iii) due to its spatial variability, it is a very representative area of the atlantic coast (marshes, mesotidal coast...); and iv) there is a high spatial resolution DEM, what was essential to guarantee a right analysis of the

## III. MATERIALS AND METHODS

### 3.1. Materials

Two types of data have been used to elaborate this work:

- Sea level surface altimetry data: Monthly mean values of the tide gauge of Cadiz, from the Permanent Service for Mean Sea Level (PSMSL).
- Emerged surface altimetry data: a Lidar DEM, which data were obtained during a survey in 2009. It has a spatial resolution of 1m and a vertical precision of 0,15 m.

### 3.2. Methods

#### 3.2.1. *The influence of the time period*

Three mean value were averaged (M1, M2, and M3) in order to evaluate the importance of the length and position of the time period in the NMML calculation.

M1 matches with the total length of the time serie, 1961-2009. M2 takes from 1990 to 1990 (matching with the period used by IPCC (2007) as a mean sea level reference. M3 covers from 1992 to 2009, corresponding to the beginning of the satellite sea level measurements.

### 3.2.2. The influence of the method

Two NMML were calculated by means of a linear regression analysis, in which the value of the NMML was the corresponding one to the final position of the trend line. In order to compare them with the same periods but a different method of calculation, R1 and R3 were calculated using the same period as M1 and M3 respectively.

### 3.2.3. Spatial analysis method.

In order to evaluate the sensitivity of the inundation analysis to the period and the methods, each of the calculated NMML were projected over the DEM. Before this analysis, it was necessary to correct the altimetry datum, which are referred to the «tide gauge zero» to the NMMLA datum. The tide gauge zero is 1,885 below NMMA in Cádiz.

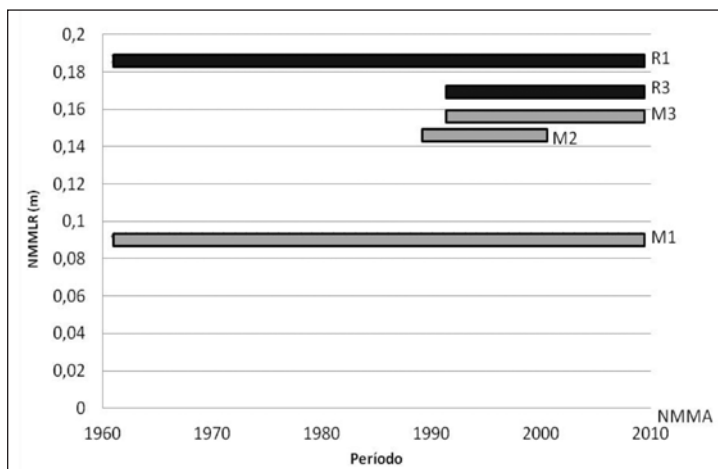
In order to identify the inundate areas, the height of the DEM and of the marine inundation surfaces were compared, identifying the cells of the DEM with a height under the height of the marine inundation surface as potentially inundated areas.

A high tide of 1.7 over NMMA was necessary added to the NMML to exceed the minimum height of 0.47 m of the DEM used. A level named H0 was used as a reference to check the importance of considering any NMML.

## IV. RESULTS

The importance of the method is obvious when comparing the obtained results for all the length of the time serie (1961-2009) (fig. 1). There is a difference of 9.5 cm when the same period but different method is used. Lineal regression analysis obtains the highest value of NMML (18.7 cm).

Figure 1  
DIAGRAM OF THE NMML LEVELS, ACCORDING TO THEIR LENGTH AND METHOD

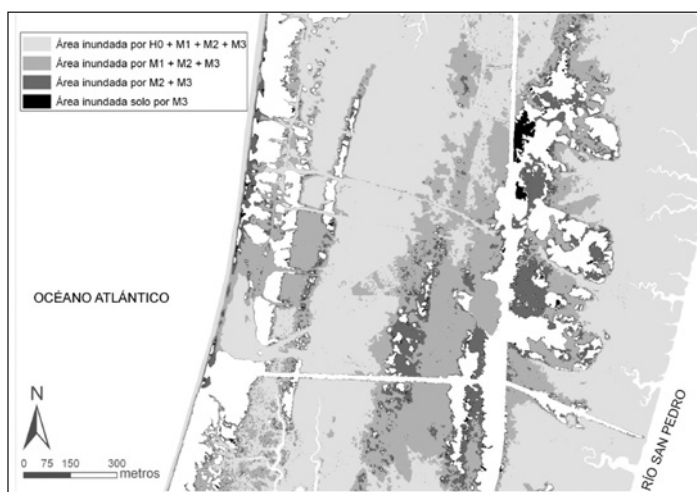


The difference between both methods is not constant. M3 and R3 levels (1992-2009 period), differences are much smaller, even R3 is still higher than M3 (17 cm vs. 15.5 cm). The shorter the period is, the smaller the difference between two methods will be.

Regarding the importance of the periods, the averaging methods make that the NMML level increase as closer they are to the end of the time serie (if the time serie has a positive trend). This effect can be observed even when there is a longer period (M3 vs M2).

All the inundated areas showed relevant differences between them and the reference period H0 (fig 2.) Even there are differences between all the calculated NMML were smaller than 10 cm, significant differences were found when they were projected over a DEM of a very flat area.

Figure 2  
INUNDATIONS OF H0, M1, M2 AND M3 LEVELS



## V. CONCLUSIONS

The high spatial variability obtained in the results show the sensitivity of the NMML to the period and method used in its calculation. It means a new issue in the analysis of future scenarios of sea level rise, and the natural hazards studies focused on this topic.

The studied parameters –period and method have been defined and used by international institutions and scientific works (Titus and Narayan, 1998; IPCC, 2001; IPCC, 2007), but they have not been enough discussed by the scientific community. They are often not mentioned in many studies, even if the DEM used for the analysis are referred to a topographic datum.

This work remarks the necessity of referring future sea level rise studies, considering carefully the characteristics of the time series and the method used to calculate the NMML. It might involve to minimize the potential errors derived from the issue of this paper.



# LAND-USE PLANNING AND URBAN FORM IN CATALONIA. THE CASE OF GIRONA REGION (1979-2006)

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## I. INTRODUCTION

Spain's entry into the European Union (EU) in 1986 marked the beginning of a new growth cycle based on the tertiary sector and real estate. This stimulated the so-called «housing bubble», one of the most distinctive aspects of the Spanish urban model in the context of globalisation. Its causes were specialisation in residential tourism, the reduction in the number of persons per household and the middle-class attitude to housing as an investment. Despite successive increases in prices, demand was sustained thanks to easily acquired mortgages.

Planning policy also facilitated this irresponsible dynamic. On the one hand, local authorities competed to increase the supply of land and attract potential investors. In addition, regional administrations, including that in Catalonia, failed to implement regional land planning instruments. The inevitable result, given the potential earnings from development projects, was a huge expansion in the urbanised area and a lack of co-ordinated planning.

Thus, urban sprawl —the phenomenon of dispersion, reduction in density and separation of uses in the advanced capitalist city— was an expression of particular factors related to planning and the economic and social structure. Various international authors have also shown that the newly global urban form has displayed new morphological categories, portraying both the changing location patterns of economic activities and residence in the post-industrial city as well as traces of post-modern culture.

This paper is a summarisation of a doctoral thesis aimed at analysing the urbanisation process in the Girona region between 1979 (the year of incorporation of the democratic councils) and 2006, the year immediately prior to the recession. This area, located north-east of Barcelona, offers a significant illustration of the transformations that have affected Catalonia and the Spanish Mediterranean coast. The study focused on the analysis of zone development plans, the documents that regulate zoning under the local development framework in each new area of developable land. The interpretation of the results was based on two

complementary scales. The regional scale is the appropriate level at which to understand the dynamics of urban sprawl. The scale of particular places facilitates interpretation in terms of urban form. A study of this kind is a pioneering study in Spain because of the time dimension (almost three decades) and the magnitude of data analysed (211 municipalities and 522 zone development plans).

## II. THE PLANNING SCENARIO

In 1979, after the Generalitat (the regional government) had assumed responsibility for urban planning, the main municipalities of the Girona region began to revise their local development frameworks. These new frameworks projected future scenarios for a period of 15 to 20 years.

The first local development frameworks prepared during this phase set out to moderate growth and resolve the deficiencies inherited from the previous period. In this context, the concept of the zone development plan emerged as the basic tool used to define the morphology of urban areas while also designating public space and facilities. But in practical terms there were problems, partly because huge pockets of developable land and numerous illegal activities had to be incorporated into the new development schemes. Furthermore, the new supra-municipal planning schemes for urban areas (such as those for Girona and Figueres) rapidly broke down after the regional elections in 1980, as the new centre-right government believed that planning was entirely a municipal responsibility.

As a result, individual municipalities begin to formulate plans according to their own aspirations. For example, in the case of one third of the local development frameworks for the urban area of Girona and the coastal municipalities, the area specified for urban development equalled or exceeded the existing built-up area of the settlement. Despite the new planning regime, inertia effects combined with irresponsible management in some cases turned new planning schemes into nothing more than a blueprint for expansion and growth. Moreover, while core towns tended to appear well designed, smaller municipalities competed with one another and their ambitious development plans merely encouraged a further wave of urban sprawl.

## III. THE PRODUCTION OF SPACE AT THE REGIONAL LEVEL

From 1979 to 2006, 522 zone development plans were approved in the Girona region involving 5,930 hectares (ha). Newly-formulated plans accounted for 69% of the area scheduled for development while the remaining 31% related to illegal projects dating from the period of *desarrollismo*, which subsequently were regularised.

The time frame covered four stages. The first extended from 1979 to 1985 and was associated with the recession of the 1970s. The second phase extended from 1986 to 1992. This was a period of rapid growth accompanied by an influx of capital investment, stimulated by Spain's entry into the EU. From 1992 to 1995, there was a brief recession, dealt with by devaluation of the currency, greater flexibility in the labour market and deregulation of the economy. A second cycle of expansion began in 1996 and extended until 2006. This cycle of expansion was even stronger than the first in terms of the zone development plans approved and its duration (more than ten years).

In tracing the proliferation of zone development plans, three spatial categories can be identified. Firstly the coast, which experienced high growth linked to the transition from traditional tourism to residential property tourism. This process also affected the coastal hinterland for the first time. Secondly, the urban areas, where development involved not only core towns but more especially nearby municipalities in the surrounding areas: in the case of the Girona urban area, only 24% of the plans related to the core town itself. Thirdly, the «network areas», namely the municipalities located on the road corridors linking Girona with other urban areas, with the coast and with the Barcelona Metropolitan Region. Although overall there was significant growth in towns, the most striking aspect of this phase was the wide spread of urbanisation throughout the Girona region.

Sprawl was defined broadly to include not only physical dispersion but also oversized extensions that doubled or even tripled the already urbanised land in a given municipality. According to these criteria, sprawl accounted for 61% of the total area covered by zone development plans. Half of this area related to subsequently regularised plans from the previous period, while half, unfortunately, related to new plans. The problem particularly affected small municipalities on the coastline, second-tier coastal municipalities and those adjoining larger urban areas where sprawl was linked to oversized local development frameworks and «on demand» modifications of these. In these cases, developers moved to the hinterland, where they found not only cheaper rural land but also local administrations, which were more likely to allow rezoning. After local municipalities had given preliminary approval to zone development plans, prospective developers and local governments then lobbied the provincial planning commission in order to win support for the plan. This led to confusion between public and private interests and enabled the private sector to make huge profits. In short, urban sprawl in many cases was the result of «free-riding» land use practices by urban developers with the consent of local administrations and in the absence of a coordinated approach to land-use planning.

#### **IV. THE MORPHOLOGICAL TYPOLOGIES**

Examination of zone development plans indicated that urban expansion involved three distinct morphological categories: urban extensions, low-density housing estates and industrial parks.

The first category is urban extension. 236 zone development plans of this kind were approved, representing 46% of all plans and 26% of the total area. Urban extensions are compact housing estates with medium-high densities. This concept dates back to the pioneering work of Ildefonso Cerdà and his urban extension for Barcelona, developed in the second half of the nineteenth century. Following Spain's transition to democracy, this model was adopted with little modification and became the quintessential template for modelling urban form and gaining public space. In its essential characteristics (compactness, and the mix of uses and social groups) urban extension embodied a high degree of continuity with the traditional Mediterranean city model.

The second category is the low-density housing estate (103 plans of this kind were approved, that is, 19% of all plans and 39% of the total area). The explosion of mass summer tourism in the 1960s led to the proliferation of low-density second-home housing estates on

the coast. Many developers, especially from Barcelona, now saw a profitable business opportunity, although in many cases this involved illegal developments and selling plots without basic infrastructure. As a result, local administrations after 1979 had to legalise many such developments by preparing new zone development plans. But in view of the limited financial capacity of both the town councils and the owners, this process often made it necessary to expand urbanised areas and sell new plots in order to finance essential infrastructure projects.

In addition, from the second half of the 1980s the demand for second homes picked up again and a new post-modern profile project developed. These new projects met the required legal standards and often exhibited high urban quality but their locational patterns and rates of land consumption were absolutely unsustainable. This was specially the case of golf resorts. It should also be noted that, in addition to leisure-oriented estates, low-density housing estates for commuters were developed en masse from the 1990s onwards in small municipalities on the periphery of urban areas. This new wave of plans was closely linked to oversized projects as well as to practices such as designing or modifying local development frameworks «on demand».

The third morphological category refers to industrial and business parks (171 plans of this kind were approved, that is, 33% of all plans and 34% of the total area). Until the 1970s, many such parks were set up spontaneously and had serious deficiencies in infrastructure. However, after 1979 the Generalitat encouraged the development of large-scale industrial parks, especially in small towns on the periphery of large cities.

From the 1990s onwards, there was a shift in the concept of the industrial estate due to the growth of the tertiary sector and globalisation of the economy. Whereas industrial estates previously had been occupied by factories, a gradual transition now occurred to a more complex format in which industrial plants, offices and logistics shared a common space or were set up in specialised estates. Indeed, new commercial and leisure activities (malls, hypermarkets, multiplex cinemas) colonised the sites located at motorway entrances and created new suburban centres. Examples of this are Espai Gironès, a new shopping mall of 40,000 m<sup>2</sup> located on the outskirts of Girona, and Girona-Costa Brava Airport. With the expansion of low-cost flights, this has become Barcelona's second airport and a focus for logistics operations and offices developments. A parallel phenomenon is the commercial strip, that is, corridors of service activities (car dealerships, furniture stores, hotels) alongside highways due to the proliferation of zone plans without any overall strategy for territorial coordination.

## V. CONCLUSION

This paper has examined a significant example of the major urban form transformations that have taken place in Catalonia over the past three decades. In the Girona region in particular, the magnitude of the process was striking. A total of 522 zone development plans were approved and nearly 6,000 ha were urbanised. This process had two components. The first of these was the growth of core cities by outwards extension from the original compact urban area. The second relates to new suburban expansion consisting of low-density residential areas, industrial parks and shopping centres, specialised in function and spatially segregated from the urban grid. In coastal areas, the process was marked by the hyperspecialisation in second-home housing estates, many of which were spatially dispersed.

In planning terms, the outcome of this phase was inconclusive. On the one hand, a new practice of compliance with the law was imposed. But the new planning model was also compromised in three basic ways. Firstly, by the inertia effects due to the physical legacy from the previous phase. Secondly, because many local plans were oversized. Thirdly, as a result of new strategies aimed at modifying plans according to the individual needs of developers. Thus, this new phase of market deregulation, acceleration of economic change and urban sprawl spawned a new crop of expansion plans and more flexibility in managing them in order to accommodate «just-in-time operations». This reflected the fact that many town councils were wedded to urban growth as the main tool for development, while the regional administration had been reluctant to establish coordination guidelines as a framework for local planning.

After a change of ruling party within the Catalan government in 2003, a new set of regional land-use plans was implemented, specifying growth rates and land use guidelines that local plans were required to observe. The recession that hit in 2007 should also encourage us to reflect further on the possible limitations of our recent urbanisation model.



# APPLICATION OF MULTIVARIATE ANALYSIS TO AREAS UNDERGOING TRANSFORMATION: THE PERIPHERY OF THE LARGEST BUILT-UP URBAN AREAS IN ANDALUSIA

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## I. AIM OF THE RESEARCH

The objective of this study is to apply factor analysis, an instrument traditionally applied to specifically urban environments, to areas undergoing transformation, namely Andalusian suburban areas, in order to verify the degree of transformation of the areas located on the periphery of the built-up urban areas of Andalusia. The 2001 Census was used as a source of information.

## II. SAMPLE

As the study shows, we chose the population of the 624 census sections of the four main Andalusian built-up urban areas: Bahía de Cádiz, Vega de Granada, Malaga and Seville. These urban areas were delimited on a strictly operational basis using geographic criteria. After defining the operational limits of these areas into smaller units regarding which there exists statistical data in Spain, namely the census tracts, these were grouped in units having homogeneous geographical features in order to detect differences and characterise each one of these areas in accordance with the results of an exploratory factor analysis.

## III. VARIABLES

In our theoretical proposal we have considered variables that indicate that we are dealing with areas subject to urban development that is exogenous or induced from the metropolis. For this purpose we have used demographic variables (population under the age of 15 and heads of family aged 30 to 44) identified with the population of urban origin, the newcomers



who in principle are the protagonists of suburbanisation. We have compared this population to people aged 65 or over, associated to the autochthonous and rural population that did not participate in the suburbanisation process.

The social variables include variables connected to the level of qualifications and to professions. Our hypothesis is based on the thesis that the population that takes part in exogenous urbanisation or suburban residential processes has a certain academic level and professions that require medium, if not high, qualifications. For this reason we chose secondary and university studies as a variable, together with professions linked to executive, technical and administrative staff jobs. Here again, we have considered the population that did not participate in these processes, in other words the rural and autochthonous population that remains outside suburban developments, including as variables retirees and pensioners, as well as the population engaged in agriculture and construction, generally associated to the figure of a worker-farmer.

We also selected variables of mobility, as in our hypothesis we consider the population of urban origin to have a high degree of mobility for work reasons, or commuting, as compared to the rural and autochthonous population amongst which sedentary jobs prevail, in particular in the first phases of suburbanisation in Andalusia.

On the other hand, given the importance of spatial mobility in areas subject to residential suburban development, we chose the variable of recent immigrants (between 1991 and 2001) and immigration by origin, taking into account the population from the metropolis or central city as well as the population from other places, including foreign immigrants.

Lastly, we included variables linked to housing, namely recent housing and secondary housing, the latter being traditionally associated to suburban areas.

## FACTOR ANALYSIS

Principal components analysis was computed, followed by the Scree test which selected four factors. Principal factors were computed and four factors were rotated to simple structure using Varimax Rotation.

## COMMENTS

On the basis of the matrix of the rotated components, the labels of each factor can be inferred depending on its correlations with the variables used.

- Factor 1. It shows high positive factor loadings for the variables of children under the age of 5, adolescents under the age of 15 and heads of family 30 to 44 years of age. It shows a negative correlation with the variables heads of family 65 years of age or older and with retirees and pensioners. Lastly, it shows a positive correlation with recent housing. In consequence, we can label this factor as «youth and recent urban expansion».
- Factor 2. It shows high positive factor loadings for the variable illiterate population with no schooling and population occupied in agriculture and construction, unemployed and unskilled workers. It shows high negative factor loadings for secondary and university studies and for white-collar occupations. We have called this factor «traditional agrarian society».

Table 1  
FACTOR LOADING MATRIX AFTER VARIMAX ROTATION

Variables	1	2	3	4	Initial Communalities
Illiterate population with no schooling	-0.35	0.667		-0,3	(0.675)
Secondary and university studies	0.269	-0.77	0.307	0.364	(0.903)
Recent immigrants (post 1991)	0.412		0.669	0.524	(0.946)
Immigrants from the city (neo-rural immigrants)	0.467	-0.26	0.753	0.258	(0.892)
Foreign immigrants				0.872	(0.920)
Other immigrants	0.278		0.465	0.747	(0.790)
Children under the age of 5	0.858				(0.735)
Adolescents (under the age of 15)	0.922				(0.822)
Heads of family 30 to 44 years old	0.917				(0.901)
Heads of family 65 years of age or older	-0.8	0.27			(0.792)
Occupied in agriculture		0.615			(0.329)
Unskilled		0.802			(0.632)
Occupied in construction		0.657	-0.31	-0.4	(0.600)
Executives and technical experts		-0.7		0.379	(0.721)
Administrative personnel		-0.79			(0.798)
Neo-rural immigrants working in the cities	0.281	-0.31	0.815		(0.866)
Sedentary workers			-0.89		(0.749)
Unemployed		0.579	-0.35		(0.396)
Retirees and pensioners	-0.69	0.443			(0.752)
Recent housing (post 1991)	0.682		0.311		(0.587)
Secondary housing				0.731	(0.535)
Eigenvalue	9.007	3.007	2.249	1.429	

(\*) Factor loadings below 0.25 have been omitted.

- Factor 3. It shows high positive loadings for the variables recent immigrants (from 1991 to 2001) and immigrants from the city (newcomers), and for newcomers who work in the city. On the other hand, it shows high negative loadings for sedentary workers, which is why we labelled this factor as «newcomers».
- Factor 4. It shows high positive loadings for foreign immigrants and other origins (excluding immigrants from the city) and for secondary housing, so we labelled this factor as having a «recreational residential function».

In order to analyse the results we prepared the factor score location indices. These location indices were obtained taking into account not only the number of census tracts, but also the inhabitants of the tracts grouped into geographic areas.

## **CONCLUSIONS**

Exploratory factor analysis has allowed us to confirm the heterogeneous nature of Andalusian suburban areas. We have established a series of categories for said areas that confirm that they entail a territory which, far from being homogeneous, is characterised by great diversity and subject to residential suburbanisation of varying degrees of intensity. We believe this model constitutes an interesting contribution to factor analysis applied to suburban areas undergoing transformation, as it provides information regarding diverse situations and the different degrees of intensity reached by suburbanisation in Andalusia (Spain).

In conclusion, we believe that in the future these areas, of an essentially dynamic nature, could evolve towards a greater degree of functional autonomy with respect to the metropolises, similar to what has happened in other metropolitan areas in Spain that are in more advanced phases of development than the ones in Andalusia.

# GASTRONOMIC TOURISM, PROTECTED DESIGNATIONS OF ORIGIN AND RURAL DEVELOPMENT IN ANDALUSIA: PRESENT SITUATION

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The rural areas of Andalucía generally concentrate their production in economic activities directly related to the primary sector. To raise the low levels of rural incomes are necessary complementary income. In this context, rural tourism –and especially the gastronomic tourism– may be the engine of economic development and of job creation.

On the other hand, interest in regional foods is increasing, based on the high quality of agricultural products which serves as an enhancer of culinary or gastronomic tourism, which has become one of the most important forms of rural tourism.

Gastronomic tourism is a symbiosis between agriculture and tourism. In this type of tourism quality food products become in promotional tools of the food industry in rural areas and, at the same time, enhances the marketing of products with a distinctive image. Therefore, gastronomic tourism offers a number of benefits to rural destinations to both individual and collective levels, such as increased sales at places of production, improved image of a tourist destination and also increases the number of tourists.

However, this type of tourism also has significant costs. Not only for individual agricultural enterprises that decide to embark on culinary tourism development, but also for development of the supporting infrastructure and appropriate marketing actions. In this sense, the creation of gastronomic routes constitutes a clustering of activities and attractions that stimulate cooperation and collaboration between local communities and neighboring regions. These gastronomic routes are a key part of the culinary tourism industry.

The certification of the quality of food products in the EU is done through a standardized system that generates two types of organizations: Protected Designation of Origin (PDO) and Protected Geographical Indication (PGI). Many agricultural enterprises promote gastronomic routes linked to certified products, such as wine routes in France.

Andalusia produces a variety of high-quality agricultural products certified by 29 PDO and 26 PGI. Products with PDO certification are olive oil (12), wine (8), vinegar (3), ham (2), olives (1), custard apples (1), honey (1) and raisins (1). Andalusia has a enormous potential to promote culinary tourism as a strategic option for development. In some cases, producers have promoted routes linked to their PDO products. And currently, wine routes are the most popular and the most visited, followed by olive oil routes.

The aim of this paper is to analyse the gastronomic tourist profile and the supply linked to PDOs and PGIs in Andalusia, in order to establish a quality tourism product appropriate for the demand. Specifically, the analysis is focused on the four most important products: wine, olive oil, ham and baked goods. To do this, field work was carried out based on two types of questionnaires:

- A questionnaire to 126 participants in gastronomic tourism routes (wineries, olive oil mills, meat companies, baked good factories, restaurants, hotels, shops) with 22 questions that were grouped into three blocks (staff – production, involvement in the gastronomic route and actions undertaken to promote tourism).
- A questionnaire to 1,009 tourists who had spent at least 6 hours in a route to know the production process, a museum, a festival, etc. based on the agricultural product. It contains 36 questions grouped into six blocks (socio-demographic profile, economic profile, profile of the potential tourist, purpose of the visit, characteristics of the visit and opinions about the route).

According to our data, tourists visiting the gastronomic routes were married (53%), had an education (77%), were between 50 and 59 years old (just over 40%), with an average income of between 1001 and 1500. However, statistically significant differences were noted in average income between wine tourists and the rest of gastronomic tourists. Wine tourists had higher incomes (32% exceed 2500 euros/month) than the rest of gastronomic tourists (5% exceed 2500 euros/month). And we noted that the higher the income level, the greater the per diem tourist expenditure. The main item of expenditure was the purchase of products related to the route, such as wine or olive oil. Regarding occupation, 20% of tourists were employees and only 7% of tourists were students.

We found that the way to know the route was associated with age. The younger tourists found the route through Internet, while older tourists knew the route through friends and family or travel agencies. So, most of the tourists chose a gastronomic route recommended by family and friends (48%). Moreover, they made the trip accompanied by the family (just over 40%) or partner (approximately 35%) and their main motivation was to visit wineries, olive oil mills or the corresponding factories, in order to know the manufacturing process and taste the products (47%). However, they only visited one winery, olive oil mill or factory (61%) mainly because these facilities are not open to the public during key hours or days. We noted that the greater the number of wineries, mills or factories visited, the greater the level of tourist satisfaction.

General services, such as communications (roads, rail networks and airports), public safety, food products, and telecommunications, were evaluated positively (58%, 67%, 53% and 72%, respectively). Tourists considered that the price of the trip (accommodation, catering and transport costs) was normal (52%), the treatment was good (48%), the environment was well preserved (72%) and restaurants were good too (63%), both the service and the food quality.

Nevertheless, not all services were evaluated positively. This was the case of cleaning, signposting of routes and accommodation. The number of accommodations and the professionalism of staff could be improved. Moreover, tourists identified the lack of complementary supply as the main weakness.

In general, the satisfaction with the visit to the route was high and tourists were willing to return to the area.

On the supply side, our data suggest companies were not strongly involved in the development of the gastronomic routes. Entrepreneurs think that the expense of adapting their facilities to tours will not be offset by revenue from tourists. So, only companies that obtained subsidies adapted their facilities.

We found that the higher the number of workers, the better the perception of the route as an additional source of income. Moreover, companies with better trained workers (or with staff retraining) had longer opening hours to facilitate visits. On the contrary, cooperatives were the most reluctant to promote gastronomic tourism.

Our findings suggest that gastronomic routes have great potential to generate wealth in Andalusian rural areas, but it requires an improved tourism orientation, significant private and public capital investment, as well as a willingness on the part of agricultural entrepreneurs to adapt to visitor needs and demands.

Cooperation between entities promoting routes, and even cooperation between routes, is a key factor. The different routes can have benefits by sharing investment, resources and knowledge to improve the development of gastronomic tourism in Andalusia. So, for example, tour packages can be designed including visits to various routes for several days.

Travel agents that offer tour packages to gastronomic tourists, as well as entities wishing to promote gastronomic routes can take into consideration the findings of this study in order to design effective marketing plans.



# NATURAL AND ANTHROPIC DYNAMICS OF THE VEGETATIVE LANDSCAPE OF THE INNER VALLEYS OF WESTERN CANTABRIA (NORTH OF SPAIN)

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## I. INTRODUCTION

The interactions among geomorphological dynamics, vegetation evolution and land uses have led to significant changes in the mountain landscapes of the Northern Iberian Peninsula during the last millennia. The aim of this paper is to emphasize these connections, pointing out the milestones that mark the historical configuration processes of these mountain landscapes. We focused our research in a Northern Iberian valley, the Lamasón valley in the Cantabrian Nansa basin (Cantabria). This is an exemplary area to explain all the occupation processes and the related changes in the vegetative landscapes of the Cantabrian Mountains. In these medium-high mountains, the extensive livestock farming associated with seasonal livestock settlements was the principal system for a long period of time up to last century and still remains quite important as an economic activity nowadays.

The interpretation of the genesis of these landscapes has been carried out from the viewpoint of the first intention being to obtain more grazing area and pasture space, which deter-



mined, from the beginning of the processes, the necessity to set consecutive, quick and effective fires to transform the land use. Here, we have analyzed those elements that have allowed us to obtain the effective threshold in the reconstruction of the exploitation systems. Moreover, we attempt to explain how and what man-provoked dynamics occur in these areas over time. To this end we developed a multidisciplinary and integrated view which allows us to set out an occupation sequence of these territories and the land use changes involved.

In this work, we have opted to consider the wide rotational slide that has occurred in the last millennia in the hills of Bustarredondo-Culazón (Lamasón valley) as the starting point for the landscape changes. The slide shaped the slopes into an irregular topography with a complex framework of small peat bog depressions. We drilled a borehole into one of them for palynological and sedimentological study and then analyzed historical documentation. This permitted us to reconstruct the vegetative development and the sedimentary mode changes of the peat bog and surrounding area. The sources have different characteristics and also the accuracy of the information varies according to the time it was registered. In relatively recent periods, we were able to make a comparative study among palynological records and historical documents and available sources found in local and regional archives. Furthermore, we attempt to understand the evolution of this medium-high mountain landscape by deepening knowledge about its plant communities and dynamics.

The analyzed area is affected by the Prevailing westerly winds and it is swept by many mass-air fronts and mid-latitude low-pressure areas, which generate mild climatic conditions with a marked oceanic influence. According to the AEMET data from the station nearest Lamasón, Rozadío (210 m), the mean annual temperatures reach 13.1° C, with a low thermal range (10°C between the coldest and warmest month of the year). The annual rainfall is substantial (1126.2 mm), and there is no drought period (minimum precipitation of 48.7 mm in July). The dominant rock type in the Lamasón valley consists of a set of continental siliciclastic sediments (Upper Jurassic-Barremian Wealdian Complex), which are typical of the Basque-Cantabrian Basin surrounded by the western Paleozoic massif (Asturian massif). The syn-orogenic and post-orogenic fluvial and torrential dissection has created the landforms and the shape of the valley, with few, little floodplains, very steep slopes and smoothed culmination. The erosive dynamics continued during the Holocene with the mobilization of materials through many fluvial incision processes, filling of the river beds and mass movements on the slopes.

The dominant vegetation cover on these valley slopes in the medium-high Cantabrian mountains has been intensely modified by humans. This intervention has been associated with fires in order to obtain pastures. Nowadays there is a predominance of subshrubs of successional plants. Around Bustarredondo, Pyrenean oak (*Quercus pyrenaica*) woods are growing just inside the water courses and bare rock areas less affected by fires. These copses are accompanied by *Betula alba* var. *alba* in the sectors most exposed to the fires. The frequent plant communities growing on burnt soils are heaths, dense plurispecific formations composed predominantly of *Calluna vulgaris*, *Erica mackaiana*, *Daboecia cantabrica* and *Erica cinerea*. *Ulex gallii* ssp *gallii* heath is also common in these areas, but it is related to older burn off and so it has become more consolidated. Along with these plant communities, we can find a grid of scythed meadowland associated with winter shelters and small marshy areas on shelf slopes. Nowadays, meadowlands are sometimes being replaced by foreign conifer plantations (*Pinus radiata*).

## II. METHOD

The fieldwork carried out was focused on three ways of deepening knowledge. Firstly, we established the positioning and interpretation of the geomorphological features. Secondly, we found and interpreted the plant communities and processes of vegetative dynamics. Finally, we choose an accumulation peat bog in order to collect sedimentary and palynological samples.

The hygro-peaty deposit chosen (Culazón peatbog, 592 m.a.s.l.) has an extension of nearly 1Ha, and it is dominated by *Rhynchospora alba* in the most damp areas. It is surrounded by extensive serial formations of *Ulex* ssp. and *Erica* ssp. We collected a drill core sample, which was specifically assessed every two centimeters. The sequence was divided into two pollen zones (A and B) with their own subzones. Twelve radiocarbon absolute datings were carried out by AMS on two different groups of samples; ten from the Culazón peat column analyzed, and two more datings from two palaeosoils located in the latero-frontal lobe area of the landslide. Some interesting transects were also chosen for floral plant sampling, by collecting those data necessary for the characterization and analysis of the most representative plant dynamics. Four community types were also defined which made it possible to assess current vegetation features and processes: Grassland over peatbog hollows, Gorse scrub over solifluidal slopes, siliceous multi-specific Heather, pseudo-rupicolous Oakwoods (*Quercus pyrenaica*).

All the point, linear and polygonal information captured through GPS was totally integrated and considered for the study. To make it possible, it was firstly converted into a layer file by using GIS software (ArcGis 9.x)

## III. VEGETATION, GEOMORPHOLOGICAL PROCESSES AND RELATED DYNAMICS

The Lamason valley is characterized by the scarce material consistency of its rocks, which has led to slope mobilization and sliding. The valley's central sector (Bustarredondo-Culazón), has asymmetric slopes because of the rotational landslide that affected them. It has formed a thick toe, which is complex, irregular and has several fronts, steps and intermediate hollows which are often closed. The runoff waters in these closed depressions flow more slowly and are occasionally retained. This situation leads to the formation of stagnant areas, wetlands and peatbogs. One of them located at the head of the landslide lobe has provided the sampling material for the pollen analysis that we have done. This sample allowed us to date the bottom part of the accumulation ( $3589\pm 60$ BP), which indicates the minimum age when the mass movement and the material slide took place.

Other erosive periods took place subsequently, which can be seen as there were little mass movements on these slopes (ca. 2.000 BP). More recently, during the documented period, we have been able to establish that intense rainfalls and consecutive floods have led to a series of mass movements and debris flows, although not as bulky as the oldest one. The information we have at our disposal for the modern period has enabled us to deduce the intensity of the rainfall in the second half of the XVIIIth century.

The great landform diversity existing on a large scale and the varied water situations occurring in short time periods that can be found here have favoured different strategies of

vegetative evolution over time. This is reflected in different dynamics that have provoked the following plant communities: *Peatbog hollows*, topogenous and ombrotrophic mires where *Rhynchospora alba* is dominant. *Successional scrubs*, constituted mainly by gorse and heather formations (*Ulex gallii* and *Erica mackaiana*). The natural phases following a vegetative cover degradation period are also present, especially caused by fire. Lastly, we can also find stony outcrops covered by *Oakwoods* (*Quercus pyrenaica*), which demonstrate previous intense burning periods which converted the other woods into meadows.

Taking into account pollen analysis results and all the documental information archives analyzed, it is possible to deduce advance-and-retreat evolutionary dynamics of certain plants in this area. This is mainly related to ground burnings in order to create new grazing areas from previously wooded areas, or in order to maintain the previously created pastures.

The current plant communities and their behaviour are simply representative of a former landscape, which was the main landscape during many historical epochs. We have interpreted the pollen sequence age, based on many C14 AMS datings of the Culazón peat core, and we have linked them with the documental information we have for more recent times. From the analysis of all these results, we have tried to deduce all the construction-deconstruction landscape processes during the last millennia.

The bottom of the core (subzone A1a, 140-117 cm), only 23 cm thick, occurred over an extensive time period (ca. 2215 cal BC-1030 cal AD), demonstrating a varied advance-and-retreat dynamic on the medium height land pastures. This sequence was followed by a second one (Subzone A1b, 117-107 cm), characterized by intensification and diversification activities, which took place between the XIth and the XVth centuries cal AD. Associated with these activities, we can find the first rye (*Secale cereale*) crop samples in this livestock area. Above this level there is a more recent one (Subzone A2a -107-93 cm), which represents a new land use change corresponding to XV-XVIth centuries cal AD. In this case, we have determined that a process of disuse of the livestock areas took place with the consequent post-fire occupation by trees.

The next levels above (Subzone B1 -79-69 cm) show that later, in the XVII-XVIIIth centuries cal AD, there was an increase in cattle-related activities and a diversification in the winter cabin farming activities. As a consequence, there was an increase in temporary crops (*Cerealía* and *Secale*). Over this level, the Subzone B2a (69-41 cm) reflects that the medium-high pastures were slightly neglected between the XVIIth and the XIXth centuries cal AD. Moreover, these two reflect a fall in both kinds of cereal crops and worsening of weather conditions. The level sequence ends with the most recent and current scrubland growth processes, taking place after burning periods on the pastures, and with a forest area advance. We must point out three different facts which are reflected in these levels: The introduction of woody plants like *Pinus*, the reduction in the pasture use intensity in these medium-high pastures and the *Secale cereale* disappearance (XIXth to XXIth century cal AD).

#### IV. LANDSCAPE CHANGES

The Lamasón valley evolution illustrates very well how natural and socioeconomic dynamics in medium-high siliceous northern mountains have been combined. To start with, we considered the erosive slope destabilization processes, which led to the mass movement

of Bustarredondo-Culazón. This landslide process started in  $3589 \pm 60$  BP (2133-1760 *cal* BC, mid-Holocene). These processes formed an irregular space, with hollows, small closed depressions with stagnant waters and wetlands, in different steps. Around 2215-1950 *cal* BC this sector was covered by hazel wood formations. These types of plants were typical of colonisation after burning areas, so they represented the pioneer formation after that kind of events. A large quantity of tree pollen was found, so it is easy to associate it with temporary pasture structures, opened after quick ground burnings. In any case, there were consecutive advance-and-retreat dynamics in the pastures, associated with two different kinds of processes. Sometimes, it was associated with an increase or a reduction in fire actions and, at the same time, to erosive processes and little landslides over *ranker* soils.

Between  $1920 \pm 40$  BP (*ca.* 82 *cal* AD, 122 cm) and  $060 \pm 40$  BP (*ca.* 980 *cal* AD, 119 cm) there is no information concerning the core. This could be related to erosive processes and sedimentary material loss, and the human factor could have had a critical influence on that. It has been found that for that period (320 *cal* AD) in Lamasón valley there were Romanized indigenous settlements. Thus this might have determined an alternation between pastures with a reduced number of cattle, and a small number of grazing areas opened thanks to specific burnings.

In the centuries XIth-XVth *cal* AD, the occupation of meadows and productive diversification was related to social development processes, through collective land use conversion carried out by small village communities. Moreover, this social development occurred with fair weather conditions, which determined the pressure on grazing areas and consequently, an increase in them. From the XVth century *cal* AD, new weather conditions occurred, whose coldest pulses provoked a new different land use. This meant a temporary disuse of this area for cattle grazing and the spread of *Quercus* plants, like at the present time. Related with colder weather (at the end of the XVI century *cal* AD.), these pastures gradually became neglected. In spite of that, a reduced function was maintained; moor plant communities increased, and the number of fires and nitration levels reduced.

Burnings started up again in the middle of XVII century *cal* AD., in association with better climate conditions and with pasture reoccupation. In this case, moor formations retreat because of the burning frequency increase. Considering these aspects, it is easy to imagine some of the sunny stony hills occupied by cereal crops.

Agricultural and livestock activity expansion and intensification continued during the XVIIIth century *cal* AD, although the wooded areas conserve similar characteristics to the previous century. These wooded areas are used as a source of energy for houses and nearby foundries, so these woods and copses became adapted to this type of economic activities. Moreover, the Navy required wood from these forests too, so any plants suitable for that use were always reserved for shipbuilding.

In the early XIXth century *cal* AD, the exploitation cycles of these areas became reduced and they were occupied during less time due to the worsening weather conditions. All the spaces previously occupied by cereal crops, became transformed into pastures. The tendency was maintained during the XXth century *cal* AD and the first decade of the XXIth century *cal* AD. Some taxons indicative of pasture and farming activities have disappeared or become reduced in number. This means that this area has become a peripheral pasture space and it has been gradually transformed into a post-burning scrubland. Cattle activities and use of

firewood have been reduced in these areas so scrubland and wooded areas have increased. As a result of the decrease in cattle-related activities, a new process has occurred, namely, reforestation. There are a limited number of reforestation examples which have mainly occurred inside the ancient fenced fields.

# PUBLIC SPACES AND GENDER IN SPANISH HISTORICAL CENTRES: THE ALAMEDAS OF SEVILLE AND SANTA CRUZ DE TENERIFE<sup>1</sup>

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Public space is studied taking into account a gender perspective that makes visible, on the one hand, the reasons that can determine the differences between men and women using it (Ortiz, 2007: 13); on the other hand, it analyses the actions that would contribute to achieve a greater equality in terms of presence and participation. This analysis focuses on the differences and similarities that present the use and appropriation of two historical and symbolic places of the cities of Seville and Santa Cruz de Tenerife, after the various physical interventions they have undergone: the alamedas of Hercules and of Duque de Santa Elena, respectively. These are grounds that have faced major transformations that are justified by the necessity to revitalize areas or urban sectors that have lost dynamism, as well as to improve inhabitants' life quality. Such an appeal to both the individual and the collective wellbeing lays the foundation for action; this action is thus endowed with legitimation and social consensus. However, the reorganization and creation of new public spaces does not always guarantee either a better right to use them nor greater opportunities for inclusive appropriation. Therefore, this analysis seeks to show how measures taken by the administration for the renewal and production of new spaces of relation, although promoting the diversification of the users, does not seem enough to accomplish the development of the dynamics of usage or of a more inclusive appropriation.

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1 This study is part of the Research Project titled «City and quality of life. The social use of open public space in Spanish cities» (CSO 2010-19007) funded by the National R&D&i Plan of the Ministry for Science and Innovation.

Using a qualitative methodology based on direct observation as well as on interviews to users, the access, enjoyment and meaning of current citizens to the studied spaces are analyzed. The main source of information has been the recognition and systematic computation –at different days and times– of users and the activities they developed, as well as conducting open questionnaires which asked for the reasons that led to the use of these spaces, the experiences that took place in them and other features on the frequency and dynamics of use.

## **I. PUBLIC SPACES, GENDER AND CITIZEN RIGHTS**

Among the factors that have influenced the modification of open public spaces, it is worth mentioning the changes experienced in the family structure and lifestyles, the perception of insecurity or the emergence of new leisure and entertainment centers (Martinez, 2003; Rebughini, 2001; Sorkin, 1992) Indeed, contemporary city planning has tended to create fields based in security rather than in the interaction, more in the homogeneity and the promotion of consumption than in the social heterogeneity and plurality of uses (Fleury, 2007), more in its potential as useful elements for urban competitiveness and commercial interest as an image that symbolizes the prevailing economic values rather than in civic identity and integration. Still, there is no denying that such collective meeting places of free access are essential to the functioning of democracy (Fraser, 1990; Marston, 1990; Mitchell, 1995), while the availability of good quality public spaces and the possibility of using and enjoying them is a citizen's right.

Many argue these spaces propitiate the feeling of belonging to a community and to a better life quality. This comes to say that it is necessary to consider these areas for everyday life in urban planning and management, as they are an essential part of the basic sociability of individuals, families, or groups of people (Roman, 1995; Jiron, 2007: 175). Thus, the city and its neighborhoods must have spaces that allow and encourage the presence of and appropriation by citizens understanding that not all use them with the same intensity and in the same way. Age may explain differential access to places and the acquisition of diverse experiences (Hopkins and Pain, 2007). Gender is not a homogeneous or easy category, so it is necessary to consider its intersection with other variables (Valentine, 2007), although it has a strategic analytical interest when addressing the issue of the presence / participation of men and women in everyday public spaces.

## **II. SIMILARITIES AND DIFFERENCES IN THE USE AND APPROPRIATION OF THE ALAMEDAS IN SEVILLE AND SANTA CRUZ**

The alamedas of Hercules in Seville and of Duque de Santa Elena in Santa Cruz de Tenerife, have been chosen because they are and have been significant spaces in the social life of their respective cities standing as symbolic places and important social venues both for the residents of nearby residential areas and for the inhabitants of the rest of the city since their inception. These are recently redeveloped areas with designs that share the peculiarity of forming large open spaces, as well as easy internal and external access for pedestrians that have been conditioned to the development of diverse recreational practices.

After having gone through a process of physical deterioration and appearing of marginal activities, the reform of alameda de Hercules -finished in 2008- meant its consolidation as



a place for leisure and commerce, but also for creative impulse and protest. The remodeling of the alameda of Santa Cruz, also opened in 2008, has similarly generated new dynamics of use favored by its physiognomic transformation and integration into a large urban park along with two other bordering public places. In the recovery and beautification of both alamedas, there is an evident concern for building spaces that represent emblematic urban models with designs that seek to improve the image of the city. Following recent changes, the use and appropriation of these areas have been reactivated, although there are some differences between the two, regarding attendance patterns, forms of appropriation, dominant age groups, and gender.

A close analysis on the greatest peaks of affluence reveals there are different frequency times that seem to be conditioned by the different city's location of each alameda. In that of Santa Cruz, it is located in the business and shopping center, close to the port area, having more dynamism and diversity on weekdays and in the mornings; thus, it coincides with the busiest activity in the urban center, which adds additional input from port movement and «cruisers» who arrive in the city. In Seville, however, the flow is more intense in the evenings and on weekends, related to its transit urban location –between the historical center, the northern sector of the city, and the historical riverbed– as well as its role as a large leisure space.

Regarding the forms of appropriation, it is worth of attention that chief modalities are the same but with different weights. Resting and conversation are the most frequent activities in Santa Cruz; meanwhile, walking and chatting are dominant in Seville. Playing and childcare, however, appear next in both places.

As for age groups, the most numerous set in the two examples is that of adults, alone or accompanied by persons of a similar age or by children whom they supervise in play areas. Other age groups do not coincide in the two places, as children and young people predominate in the case of Seville while elders do in Santa Cruz.

The peculiarities in the layout and provision of furniture and other items in each alameda (benches or playing areas) influence in the variables of attendance and appropriation already mentioned, but certainly a key aspect regarding frequenting and forms of use is gender.

In a first approximation we can say that gender differences are noticeable in both alamedas. In Seville there is a balance between men and women; there are no signs of exclusive patterns in the activities they carry because most of the cases are family groups whose importance can be partially related to the physical and socioeconomic changes undergone by the residential environment. So, if this space had been a citizen's emancipatory icon in previous decades (Lees, 2004) or of countercultural movements, the largest influx of people has softened this role, although some inclusive, tolerant or equitable behaviors are still noticeable in the way the space is used.

In the alameda of Santa Cruz, males predominate in all the observations carried out. It is, however, a difference that corresponds to the prominent influx of retirees who come to sit outside and chat, especially in the mornings. Nevertheless, male superiority masks the true representation of adult women of reproductive age, whose numbers, as in Seville, are equal to or even slightly higher than those of men from the same age group in the various observation periods. Adult women are present accompanying and playing with young children, particularly in the evenings and on holidays. Therefore, the differences are caused by the very



low numbers of elderly women. It is rare to find them resting or chatting because reproductive work carried out at home or helping out in the homes of their children are a daily reality for many of them; that limits their opportunities for recreation, which loses quality as it is mediated by their responsibility in caring for others.

### **III. CONCLUSIONS**

Throughout the fieldwork one can suggest that the transformations that have given shape to these two alamedas point to certain types of users, behavior patterns, and recreational practices. In respect to users, a clear analogy can be established between the two spaces in the frequency increase, as well as in the diversification of profiles; one of the profiles that have to be highlighted is that of family groups, which have been favored by the introduction of specific playing areas for the very young, as well as expanding the pedestrian area for transit and ride. These issues affect the presence of adults of both sexes showing a similar importance in the two alamedas.

As for the relationship between social practices and categories of gender and age, a male bias -responding to the relevance retired men have acquired- appears in the alameda of Santa Cruz, but not in that of Seville. If we pay attention to the activities or ways of appropriation, the differences between the two examples are more influenced by age than by gender. The traditional division of tasks is neatly perceptible among elders and less so among adults. Although various provisions and new furniture are incorporated (playing areas for children, benches, vegetation ...) and thus possibilities of entertainment and leisure are enlarged, the basic conflicts between needs and endowments are still detected. This lack of design quality for everyday sociability expresses the fact that in the redevelopment carried out a concern for aesthetic criteria has prevailed upon the functionality, an aspect undergone by men and women alike.

# BIODIVERSITY AND CONSERVATION VALUES OF THE SERPENTINE ECOSYSTEMS IN SPAIN: SIERRA BERMEJA (MALAGA PROVINCE)

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## I. INTRODUCTION

Serpentine ecosystems are considered as topics of great interest in Conservation Biology and in Conservation Biogeography. These original ecosystems are spread by the terrestrial surface and they are experiencing a period of changes as a result of human activity. Part of the exclusive habitats that live in serpentine have been disrupted or destroyed because of mining and building or they have been divided into little fragments of land while others have been transformed by agriculture, livestock or forestry management. Populations of endemic plants and animals have also a high rate of extinction and climate change, boosted by fires, threats these barely studied «biogeographical islands».

In Spain, the serpentine ecosystems are located mainly in Andalusia (Serranía de Ronda) and Galicia (Sierras Capelada and Careón) and show a scarce surface area and irregular and fragmented distribution. These outcrops have unequal degrees of protection and insufficient scientific knowledge. Sierra Bermeja stands out among the most valuable, unknown and threatened peridotite outcrops. This mountain acts as the scenery for the Costa del Sol touristic resort. The massif is the main habitat for taxa and biological-biogeographical processes that deserve conservation measures, especially when adaptation to ultramafic soils is involved. Currently, there is a lack of functional studies that demonstrate the existence of such processes, despite the anthropogenic threats that they face.

Only some endemic species have been analyzed for biogeochemical variability such as *Abies pinsapo*, or nickel hyper-accumulators, such as *Saxifraga gemmulosa* and *Alyssum serpyllifolium*. Nevertheless, serpentine flora and vegetation, unlike in the case of fauna, have attracted the attention of botanist in the last four decades.

The urgent priorities for conserving this complex and threatened ecosystem and the lack of knowledge and awareness in the citizens have moved us on to carry out a search and a synthesis of the bibliographical data about Sierra Bermeja serpentine ecosystems. In this work, we try to contribute with a new and quantitative synthesis about the Biodiversity and conservation values of the peridotite massif. The results will reinforce the previous studies that propose the inclusion of this mountain in the Spanish net of National Parks.

## II. METHODOLOGY

According to the concept of ecosystem, a holistic perspective has been adopted to obtain a complete and synthetic view of the conservation values and protection priorities for the biological diversity in Sierra Bermeja. Firstly, an exhaustive search and revision for bibliography about the ecosystems of Sierra Bermeja was made. This search included all the local studies and unpublished works. Secondly, data about conservation strategies for the biodiversity of the outcrop were analyzed and systematized, focusing on endemism, threatened and/or protected species and prioritized habitats. The compilation and synthesis of the previously dispersed information tries to improving the efficacy in the decisions to be made about considering Sierra Bermeja as a National Park (NP) according to legislation (Law 5/2007, Red de Parques Nacionales) and other criteria. Finally, the biodiversity value of the study area is compared to other Natural Protected Areas of Andalusia and the protection status with regard to other ultramafic outcrops in Spain. This comparative analysis is needed to positioning Sierra Bermeja in an adequate context regarding nature conservation policies and to determining whether it presents conservation values higher than those for other protected areas.

## III. STUDY AREA

Sierra Bermeja is located in the south of the Iberian Peninsula and constitutes the biggest outcrop in the Ronda and Betic mountain ranges and one of the biggest in the world (more than 300 Km<sup>2</sup>). This massif includes two mountain of importance: Palmitera y Real. Peridotite, and ultramafic igneous rock with high density and hardness, is composed of ferromagnesian minerals (90% olivine) that, when altered, are classified as serpentine. The peridotites of Malaga are mainly composed of lertzholite and hazburguite. Besides the special lithological nature, among the most important biogeographical aspects that influence on the flora and fauna in Sierra Bermeja is the strategic geographical position between Europe and Africa. Also of note is the topographic configuration as Sierra Bermeja is the westernmost point for the Betic Mountains and the elevation (1.500 m) that stands out in the landscape respect the coastal planes on the foot of its southern slope.

Climate is Mediterranean subhumid-humid, with mean annual rainfall between 800 mm near the coast and 1600 mm in the top of the mountains (probably reaching 2000 mm due to horizontal rainfall because of Levante winds) where snowing is a frequent event in winter.

Mean annual temperature is 14-16 °C and three bioclimatic belts are recognized: thermomediterranean (reaching to 800 m), mesomediterranean (800-1300 m) and supramediterranean (1300-1500 m).

Interrelation of these unique environmental conditions cause the natural geochemical processes of transformation of the peridotite rocks and the subsequent formation of serpentine soils of Sierra Bermeja which are outstanding when compared to other substrata. Singularities of serpentine soils include: limitation of essential nutrients as N, P and K and basic cations, as well as low proportion of Ca<sup>2+</sup>/Mg<sup>2+</sup> (0,84), high concentration of heavy metals (Cr, Ni, Co, Cu) (altering metabolism of some plants) and a xerophytic character with high risk of erosion.

Consequences over plants and animals caused by the special edaphical composition are known as «serpentine syndrome» or «serpentinomorphoses» and generates a flora and vegetation different from those living on other substrates non-serpentinic. As a consequence, several endemism are exclusive from Sierra Bermeja and other typically Mediterranean plants are excluded and so are alien plants. Geographical situation of the massif has made it refugia for Tertiary taxa migrating between Africa and Europe and an important location for animals, especially birds.

Geological isolation has helped the existence of a unique biogeographical sector (Bermejense) which put together the exceptional natural values of Sierra Bermeja, representing one of the main speciation centres of the Spanish flora and vegetation. Among the different plant communities, forests of *Pinus pinaster* var. *acutisquama* Boiss. are replaced in the top of the massif by fir forests (*Bunio macucae-Abietetum pinsapi*).

Some civilizations have modified the landscape and the vegetation but this effect has increased since the middle of the 20th century as a result of the creation of the Costa del Sol touristic resort. Since then, traditional exploitations in Sierra Bermeja are being abandoned and fires are increasing with high-recurrence (14.5 years). On the other hand it is of note the strong urban pressure from touristic towns as Casares, Estepona, Benahavís or Marbella, which have based their economies in licensing residences and huge projects linked to golf as one of the Libyan Foreign Bank (480 hectares in La Resinera). A motorway project between San Pedro and Ronda, would divide the peridotite massif into two pieces. In Sierra Bermeja nowadays, prevail forestry and livestock linked to little towns as Genalguacil, Jubrique, Júzcar, Igualeja or Istán.

## IV. RESULTS AND DISCUSSION

### 4.1. A synthesis of the natural values

There is not an exhaustive catalogue of plants from the complete massif considering that a great part of the Andalusian flora does not inhabit on serpentine and there are some important endemism. 317 species of vascular plants have been recorded in the «Los Reales de Sierra Bermeja» Natural Park.

In the complete massif 20 edaphical-endemism have been identified (13 species and 7 subspecies or varieties). Some taxa are also endemic but with a wider distribution (Serrania de Ronda) as *Abies pinsapo* or *Ulex baeticus* subsp. *baeticus*. This serpentine flora is special

due to the abundance in endemics, low diversity, the presence of relicts, the mixed vegetation with acidophilus and basophiles species, the dominance of xerophytes, hemicryptophytes and chamaephytes, the dominance of the Mediterranean floristic element, high presence of Asteraceae and pteridophytes, vicariancy phenomena and serpentynomorphs. Four of the endemism are classified as «vulnerable» in the regional legislation and others are catalogued as «special protection». Only one of the serpentynomorphs is protected by state legislation (*Galium viridiflorum*).

Doubts on the existence of *Nolletia chrysocomoides* in Sierra Bermeja are consistent although it is classified as «extinct» in the regional red list. Spanish legislation only protects one of the serpentine endemism but 28 are included in state and regional red lists (24 in LRE and 31 in LRA). It is worthy of note the existence of a large number of taxa with high risk categories in Sierra Bermeja following the red lists as *Nolletia chrysocomoides* («Extinct»), *Allium rouyi*, *Centaurea lainzii* and *Peucedanum officinale* subsp. *brachyradium* («in critical risk of extinction»). At least eight more are catalogued as «risk of extinction» summing up at least nine taxa highly threatened (one extinct) included in red lists.

With regards to vegetation, almost every association described for Sierra Bermeja is a phytosociological endemism including the alliance *Staezelino baeticae-Ulicion baetici* that gathers the serpentine shrublands. The pine woods (*Pino pinastri-Quercetum cocciferae*) and fir forests (*Bunio macucae-Abietetum pinsapi*) considered as climatic vegetation are exclusive from peridotites of Malaga.

Bryophytes flora includes two mosses endemic from the Iberian Peninsula: *Isotecium algarvicum* and *Rhynchostegiella durieui*. Both are not still included in the Atlas of threatened bryophytes of Spain.

The fauna of Sierra Bermeja includes 216 species with 18 endemism most of them protected by European, Spanish or Andalusian legislation. As a 50% of endemism have been described in the last 10 years and an 80% in the last 20 years, there could be a not evaluated threaten risk. This fact could give a major importance to Sierra Bermeja as a centre of origin for species, especially invertebrates, with 13 species included in the Andalusian Red Book of Invertebrates (LRIA), 9 species are included in the Spanish Red Book of Invertebrates (LRIE), 6 included in international agreements and 4 in the Andalusian Catalogue of Protected Species. Sierra Bermeja is included in the LRIA as an «important area for conservation of threatened species» for Odonata (area 3), Coleoptera (area 10) and terrestrial Mollusca (area 8) and so is a part of the top ten areas with a higher number of threatened species. In relation to vertebrates, Andalusian environmental Agency has carried out cartography (1:400.000).

With regards to vertebrates, the Andalusian government has mapped (1:400.000) the species diversity: continental fishes (64), amphibians (34), reptiles (89), birds (309) and mammals (105). Shannon-Wiener index was applied and values between 0 (null) and 1 (maximum) were obtained. The value of this index for Sierra Bermeja is more than 0.9 «very high». *Squalius malacitanus* among all the vertebrates must be highlighted as endemic from Sierra Bermeja, together with other species which are living in «refugia» as relicts (*Salarias fluviatilis*) in the rivers Verde and Guadaíza.

Summarizing the diversity of the biota, Sierra Bermeja holds several habitats of the Natura 2000 European net of protected spaces and more than 60 threatened species (UICN). In

Sierra Bermeja are found 15 habitats of the 230 European included in the Appendix I of the Habitats Directive 92/43CEE, constituting 6,52% and 3 classified as «priority».

#### **4.2. Comparative analysis of natural values and protection regimes**

We have compared several natural Mediterranean areas (Biodiversity Map of Andalusia) in terms of number of endemic plants and vertebrates. Sierra Bermeja has been catalogued as an «important area for Spanish threatened flora» with an «exceptional» qualification, the highest in the classification. In this study, the endemism rate, threaten risk and concentration of species and communities were taken into account. Among these areas, Sierra Bermeja is ranked number 20 for Spain but number 4 in the Iberian Peninsula, only surpassed by Sierra Nevada and satellite mountains (Gádor, Cazorla). This remarkably high significance of the natural values of Sierra Bermeja also reflects an insufficient knowledge of this massif because the endemic species of invertebrates were not selected for conservation studies. None of the compared areas reaches the geological exclusivity of Sierra Bermeja.

Ultramafic areas are unequally considered in the legislation for protected areas with a disperse net of protected spaces which do not consider the diversity and originality of the serpentine ecosystems (Andalusian and Galician) as a whole in Spain.

Ultramafic massifs are included generally in the Natura 2000 net except for Sierra Alpujata and satellites peridotite mountains in the Guadalhorce valley. This fact does not give an effective protection to these areas because fires, alien species, urbanization and motorways affect them severely.

Sierra Capelada is classified as SCI «Costa Ártabra» (COD: ES1110002), together with a coastal area in the north of La Coruña province with more than 100 km long (Ferrol and Ortegal). The Sierra de Careón, (La Coruña, Lugo and Pontevedra provinces), has been recognized as a SCI «Serra do Careón» (COD: ES1110014) and partially included in the Biosphere Reserve of Terras do Miño (Friol municipality). In Malaga province, the Sierra de Aguas is declared as SIC «Sierras de Alcaparaín y Aguas» (COD ES6170009). The Sierra Parda de Tolox is totally included in the SIC «Sierra de las Nieves» (COD ES6170006) and in the Natural Park and UNESCO's Biosphere Reserve as well as in the «Intercontinental Mediterranean Biosphere Reserve Andalusia (Spain)-Morocco», and so it is the best protected ultramafic outcrop in Spain.

Finally, Sierra Bermeja has been unequally recognized with different conservation regimes that affect it partially: two European SIC Natura 2000 (SIC «Los Reales de Sierra Bermeja» (COD ES6170004) and SIC «Sierras Bermeja y Real» (COD ES6170010)) (2 Andalusian SAC), one Natural Site (Los Reales de Sierra Bermeja), a part of the Natural Park «Sierra de las Nieves», one SPA and it is integrated in the Biosphere Reserves forwardly cited.

As well as for the late implementation of the net of Andalusian Natural Protected Spaces (RENPA) in Sierra Bermeja, it is of note the absence of coordination of environmental politics that affect this mountain, with several areas without effective protection: the serpentine outcrops reaching the coast (nowadays under urbanization) or two of the three unique fir forest in the World (Cerro Abanto and Sierra Real) vaguely protected.

Taking into account those deficiencies, in the last years there have been an increase in the scientific and social sensibilities on the need of protecting the natural values of the Span-

ish ultramafic outcrops and particularly Sierra Bermeja, the most valuable and threatened. Recently, different NGO and scientists have proposed for this mountain the category of National Park, the highest Spanish rank for a net of representative natural areas in good conservation state. With any doubt, the conservation of the serpentine ecosystems is a priority for Spain.

# THE IMPORTANCE OF FLOATING POPULATION IN RURAL MUNICIPALITIES OF THE INLAND OF IBERIAN PENINSULA. ANALYSIS OF THE SITUATION IN CASTILLA Y LEÓN<sup>1</sup>

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## INTRODUCTION

The demographic losses in rural municipalities are a constant for more than a century and if at the beginning of XX century half of the Spanish population lived there, in the middle of it there was only a third and it is a little more than a tenth of the population at the present, which is a consequence of a settlement model concentrated in the coastlines, the large and medium-sized cities and the main fluvial valleys. Nevertheless, the number of municipalities has hardly decreased, defining wide territories for their low population density, restricted economic power and growing needs of social and healthcare services. Castilla y León is a typical example, because it preserves a low population density and a high municipal fragmentation, with three quarters of the surface occupied by municipalities and with less than one thousand inhabitants, whose survival depends on a «seasonal economy» linked to tourism, which attracts a large floating population.

The analysis of this external input does not present problems when it comes from regulated tourism, but does so in the non-regulated or residential one, which shall be calculated in light of indirect data and surveys. In the non-regulated type, the interior tourism dominates, headed by Spaniards who travel short distances in 90% of the time for many reasons, staying in private accommodations. In Castilla y León, a region which historically is host to many migrants, the significance of these movements is bigger because of both the maintenance of family ties and

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the preservation of former homes when those ties disappear. In addition, there are numerous second dwellings of visitors from other regions and the territory presents a high attractiveness for rural tourism, which holds the first place among the Autonomous Communities.

The importance of the external, demographic and social contribution, as well as its temporary character does not hide a reality defined by its strong ageing population, its natural and negative migratory balances, as well as the limited entity of most of towns. These circumstances, helped by the economic crisis, have motivated the redefinition of the local administrations map in a new model of regional planning, redistributing competencies in order to create economies of scale. However, from a geographic point of view, the problem should not be solved just considering the number of residents per municipality and it must include additional parameters derived from its territorial reality. Among them, the relevance of floating population is crucial to know its real economic viability.

## **I. THE CONTRIBUTION OF AN INLAND TOURISM CLOSELY RELATED TO THE MIGRATORY EXODUS**

The seasonal character of inland tourism responds to holiday periods, but its calendar displays specific features. The monthly variations show increases in March and April -Easter Week- which are above the Spanish average, though they are lower than it during summer and they are very far from the variations recorded in the beach tourism destinations. The festivities also involve an increase in the number of displacements, especially if the closeness of weekend allows extending the stays, exceeding national average rates as well as at Christmas time. Temporal distribution varies depending on whether travellers come from inside or outside the Community, providing outside travellers a more accurate reflection of this seasonal factor. Half of the visitors move for leisure or vacation reasons, travelling short or medium distances, because the majority comes from neighbouring regions or their own Community and they use their own car. These journeys, which are apart of package holidays, are made by couples with high or medium educational level and underage children, they visit homes of relatives and friends for short weekend stays and they can even stay longer when their dwellings are rented.

Although the monthly distribution does not reflect exactly the causes of displacement, its classification and origin enable us to specify the impact that it has in population variations and as well to know when they take place. More than the half of journeys are done at weekends; they increase if the linking of holidays encourages the arrival of visitors from other regions. This concentration is independent of the purpose of the travel, even though it is for cultural tourism, visits to relatives or leisure reasons. By contrast, seasonal holidays attract proportionally less residents in the Community towards towns, but the number of foreign visitors increases. However, from the point of view of the impact in local economies, it is not as important the number of travellers as the time they spend at their chosen destinations. Summertime achieves one third of overnight stays, weekends a quarter, and even more at long weekends, while joining Easter and Christmas holidays we hardly obtain another 10%. Apart from these dates, the stays related to visits or leisure are scarce and they are distributed randomly during the year, having employment or study stays a greater economic impact.

The emigrant population, still linked to its place of origin, has a great value and, whether it lies in other nearby regions or in Castilla y León cities, it takes advantage of rest days to

return home. Madrid is the region with the largest number of residents from Castilla y León and which provides the greatest number of visitors; it is followed by País Vasco and in less quantity by Asturias, Aragón, Galicia, Cantabria, Castilla-La Mancha, Navarra, La Rioja and Extremadura. Proximity explains the large number of short stays of travellers from the area, adding other visitors who have got second homes. Finding out the exact destination of the latter is more problematic, but it appears that the majority of them go to rural areas, because a 69% just go for a walk in the countryside or for enjoying the nature. Three quarters of the visitors choose to stay at family homes (6.4million) or in their own homes (5.7); in both cases their stays are longer (Instituto de Estudios Turísticos, 2008). The figures of regulated tourism, although they are high, are far from the former figures, whether we talk of hotels (1.7) or rented dwellings (0.9). Both include rural tourism partially, in which Castilla y León holds the first place at national level, attracting more than one fifth of those who practise it in Spain. The main points of origin coincide with those of non-regulated tourism, with a stronger participation of Andalusians, Catalans and Valencians. By adding the international tourism, regulated tourism overcame the four million people in 2008.

The predominance of accommodation in private homes is explained by means of the prevalence of visitors, the return of emigrants and, to a greater extent, the residents' spatial mobility, who lead more than half of displacements. The intensity of emigration suffered by Castilla y León towards Madrid, together with the touristic power of Meridional mountain and the abundance of second homes in it explain the high intensity reached by the internal tourism in that region. This attraction is also led by the Merindades of the north of Burgos among the population from Vizcaya, as well as by León in Galicia and Asturias, encouraging tourism in outlying areas. In the intraregional tourism, the demographic weight of urban centres marks the differences, as a direct result of the attraction in previous stages of emigrants from the same province.

In conclusion, this is a tourism related to the continued existence of kinship ties and the possibility of free accommodation, including in the second case both family dwellings and second homes of former migrants or tourists who were born outside the Community, demonstrating the importance that rural exodus maintains in actual dynamics of the small municipalities, generating flows that revive the local economy.

## II. THE ABUNDANT AVAILABILITY OF DWELLINGS IN RURAL AREAS

The inland tourism masks the role played by rural centres as receiving centres, by providing data at provincial and regional level, but not at municipal one. It must be analysed both the amount of available housing stock and its occupancy, because the accommodations are predominant. At municipal level, the *Real Estate Cadastre* provides the information, although it does not indicate the main or second character of the residence, whereas it does the *Estimate of Housing Stock* at provincial level. A combination of all the parameters is found in the *Population and Housing Census*, which entails the problem of its ten-year periodicity.

From 2000 to 2010, there is a considerable increase in the number of dwelling building permits, declining rapidly since 2008 due to housing crisis. Single-family homes were 39%, a large proportion of these are located in rural or peri-urban areas, and consequently the spatial distribution of residents and residences was far from coinciding. Cities and their peripheries

concentrated two thirds of the regional population but only half of the dwellings, due to the smaller size of family units, the significance of the unoccupied homes in villages and also the abundant presence of second homes in them; if the housing stock grew 19%, second homes reached 26%. Its relative importance is higher in *Ávila*, *León*, *Segovia* and *Zamora*, giving the first place in absolute figures to *Ávila*, *Burgos* and *León*. These changes consolidated the dominant position that was already occupied by *Ávila*, with a modern housing stock, in a better state than the other provinces' and whose rise was due to the proliferation of urbanizations used as second homes. Without reaching these limits, the housing stock evolution in *Burgos*, *Segovia* and *Soria* presents very similar trends and, together with *Ávila*, these provinces have got the higher number of visitors coming from outside the Community. The influx of Madrid extends to the whole south-eastern sector of *Castilla y León*, as well as the influence of *País Vasco* to the north of *Burgos*. *Zamora* has also experienced a boom in this regard, due to the maintenance of family homes by emigrants, as well as many of them have bought a new house, to which will be added other tourists of diverse origin (Ministerio de Fomento, 2010).

Real State Cadastre estimates the availability of accommodations in private homes, comparing the population with the housing stock capacity. The occupancy level of dwellings shows differences between urban and rural areas; market towns are very important in these rural areas, where the medium size of families is higher. Differentiating among the total number of dwellings and the owner-occupied housing is fundamental, considering as well its level of habitability, which is in inverse proportion to the demographic loss. Regions with lower population density and areas with many new residential developments, present very low occupancy rates, due to they increase their housing stock with dwellings of non-registered owners. Those with lower density are mostly very small centres that hardly receive seasonal visitors, whereas the floating population constitutes one of the bases of its economy in the regions with new residential developments. This information is combined with the inhabitants/dwelling relation, which is less than the national average in *Castilla y León*. There are several reasons and they go beyond the low population density, including the high number of empty new construction homes, especially in *Ávila* and *Soria*. A quarter of the occupied dwellings have a single resident, generally over fifty years old. This situation is more extreme in rural areas and it reflects the large number of underutilised dwellings for the greater part of the year, though the relatives use them during holidays and weekends.

After these houses belonging to families, second homes are the most common ones used by tourists, representing 41% of the existing homes in rural areas; this proportion is even larger in less important rural villages. Municipalities with less than ten thousand inhabitants, with a third of the regional population, bring together nearly two thirds of the total of these dwellings, which in many cases are predominant, because by losing population and occupation in main housings, the proliferation of second homes has increased their relative importance. Although the relevance of second homes is evident, figures must be clarified by means of other factors, as the proportion of empty homes and dilapidated housings; this proportion is higher in rural areas except in more dynamic market towns. After doing these corrections, the provincial distribution of second rural housing and its capacity to accommodate floating population shows the attraction potential of *Ávila* and *Burgos*. The difference with the rest of provinces is evident; second homes exceed half of the housing stock only in some rural municipalities of *Segovia* and *Soria*.

The combination of the sources of information indicated let us see the importance of second homes in areas of higher tourist attraction, outstanding the southern belt of Ávila and Segovia, extending to municipalities of Soria, as well as the Merindades of Burgos, where these dwellings equal or outnumber the primary residences. On each one of the regions mentioned, the service centres gather the bulk of the maximum available occupancy, while in relative terms, these are the lowest population centres where the impact of this temporary contribution gains significance. The *Survey of Local Infrastructure and Equipment (EIEL)* confirms the revitalization of the rural world in the summer, that also affects to weekend visitors in a lesser extent throughout the year, multiplying several times the number of people registered in the census in the highest tourist influx.

### **III. THE UNEQUAL SPATIAL INCIDENCE OF POPULATION CEILINGS**

The connected population, according to the *Population Census*, includes displacements caused by work, studies and availability of second homes, this last reason has a greater impact in the demographic burden of rural municipalities. It is accompanied by the regulated tourism and the accommodation in other dwellings, also taken into account. These visitors add an additional burden in provision of services and use of infrastructures, although they also create earnings for the local economy. There in lies the interest in quantifying the total floating population and the reasons for their presence, distinguishing them by their origin and scale, because the more their origin is concentered, higher will be the quantity, by including both inter-provincial and intermunicipal displacements.

The connected population reached one million people in 2001 and the quotient between total and resident population was 139%, the second largest in Spain after Cantabria, highlighting the role of Madrid and País Vasco for the same reasons. The studies and work do not produce considerable outflows from other regions, though a great number of visitors from Castilla y León live in municipalities outside their residence place for work reasons (40% of the whole floating population). Dismissing intra-provincial displacements, the count is reduced by half, demonstrating the importance of short-haul journeys, which are rising due to the expansion of peri-urban belts. By contrast, the connection of second homes involves longer distances among provinces of the Community as well as outside it. At local level, the *Census* confirms the plan already described using other available sources and it highlights the importance of the outflows to Ávila and Segovia, as well as the role played in them by emigrants from Castilla y León, who live in Madrid, and those emigrating from País Vasco to Burgos, from Asturias to León or from Aragón to Soria. Geographical proximity explains the origin places of the connected population, bearing in mind that the enormous demographic weight of Madrid reduces, in relative terms, the presence of other visitors. Castilla y León is the main destination for travellers coming from the Spanish capital, but it also holds the first place in extra-regional journeys by visitors from Asturias, Cantabria or La Rioja, while travellers from Galicia and País Vasco rank the second place (FAMILITUR, 2010).

The phenomenon of connection was already visible in rural municipalities in 1981, finding the highest differences between habitual and temporary residents in the least populated villages of Ávila, Burgos, Segovia and Soria. The exogenous contribution, just considering leisure journeys, has increased a quarter during the last decade. The inaccuracy of the survey

answers lets one suspect that a large proportion of displacements declared «family visits» are also related to holiday reasons. According to the *EIEL* (2010), the population added during the summer reached 1.2 million people, beating both the resident population in this type of municipalities (0.9) and the population that received the entire Community in 2001. The least populous villages have seen the greatest benefit in relative terms, tripling or even quadrupling their inhabitants. The figures coincide with those provided by the sources related to internal tourism, availability of housing and evolution of connected population. These quantities rise when you analyse specific centres. The Nomenclator has been consulted for establishing with greater certitude the rural areas and for including entities, which despite being classified as urban, they do not have this character. Except in peri-urban belts, there is a rural population with over 922,082 residents, distributed in 5,145 centres and they increase a 129% during its seasonal peak. As it was showed in the municipal analysis, smaller municipalities present a higher increase, because they suffer an extreme ageing, which implies the predominance of isolated individuals or old couples, and it means that family visits tripling the resident population, and even quintupling it in entities with less than 100 inhabitants.

The main destinations of floating population, in absolute terms, are service centres located in Tiétar and Alberche Valleys (Ávila), whose residents were 61,943 in 2010, but they reached 269,275 inhabitants during the summer, increasing by 4.3 times. This rate reaches 3.2 (from 24,753 to 79,322) in the southern belt of Segovia and Sierra de Guadarrama, and 2.7 (from 26,125 to 71,016) in Merindades. Other market towns, but with a more scatter distribution, also triple their residents (Valderas in León and Riaza in Segovia) or double them easily (Burgo de Osmá, in Soria), also highlighting some smaller municipalities with in the North of Palencia (Barruelo de Santullán), the riversides of León (Valencia de Don Juan) and the northwest of Zamora (Puebla de Sanabria and Galende, among others). In short, municipalities of intermediate size with higher population density, with between 2,000 and 5,000 inhabitants, or those less populated that, without reaching the thousand, have to fulfil similar functions because they are located in low-density population areas.

#### IV. CONCLUSIONS

The rural areas of Castilla y León have been marked by a continuous population decrease for more than half a century, which first experienced an intense exodus towards cities inside and outside the Community and, nowadays follows a negative natural dynamics, due to the high ageing of their residents. The statistics of the *Municipal Register of Inhabitants* give a very negative image, but they also mask other realities. There is a high floating population who visits relatives each summer or at weekends and retains its old residence or has built a new one. Visitors of other Autonomous Communities join to it; duplicating easily their number of inhabitants, boosting their economy and allowing both the support of business still remaining and the proliferation of new ones. But the population growth generates a further demand for services and it requires the maintenance or creation of infrastructures. The delimitation of a new map of Local Administration must take account of this reality, as well as avoiding using as the only variable the number of residents and also considering the floating population for initiating any governance and regional planning policy, which implies a redistribution of the location of equipment and service centres.

# DAILY PRECIPITATION CONCENTRATION AND THE RAINY SPELLS IN THE CANARY ISLANDS: TWO RISK FACTORS

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The analysis of rainfall, to characterize its danger to different spatial and temporal scales, is of interest due to its effects on geo-hydrological processes and on the analysis of erosion and soil loss. Many authors warn, in the current context of global warming, of a change in precipitation patterns towards a greater frequency of extreme weather events (Karl *et al.*, 1998, Houghton *et al.*, 2001, Zhai *et al.*, 2005, Zhang *et al.*, 2009, Li *et al.* 2011; IPCC, 2012; Coscarelli and Caloiero, 2012). In this sense, the increase in days with heavy rains, which provide large amounts of water to the annual total, means an increase of risk to the local populations and their activities, especially in areas with steep slopes and little vegetation cover, such as those of the Atlantic archipelagos (Marzol *et al.*, 2006; Dorta, 2007).

It is therefore necessary to know the structure of the daily precipitation scale in these places. To do this, Martín Vide (2004) proposed a Daily Concentration precipitation Index (CI) which has been applied in different regions with very different results. Thus, in the case of the Iberian Peninsula CI spatial patterns show two clearly differentiated areas: a) the regions closest to the Mediterranean with higher concentration ratios, around 0.70, and b) inland regions of the peninsular and regions near the Atlantic coast with values of 0.55. In the first case, 25% of the rainiest days contribute almost 80% of the annual total, while in the second case this percentage drops to 65% (Martín Vide, 2004). The same differences in the CI values can be seen in other Mediterranean regions. Coscarelli and Caloiero (2012) obtained values between 0.62 and 0.45 in the region of Calabria in southern Italy. In the Canary Islands, where the irregularity and torrential nature of the rain are two of its main features, this type of analysis is critical because damage associated with rainfall has increased in recent decades due to increased levels of construction in vulnerable areas near to or in the same water channels of the ravines (Horcajada *et al.*, 2000; Romero *et al.*, 2004; Marzol *et al.*, 2006; Máyer and Pérez Chacón, 2006; Dorta, 2007; Mayer, 2011).



## I. DATA AND METHODOLOGY USED

For the purposes of this paper, 91 series of daily precipitation were chosen from the period between 1970 and 2003. These series are from the Meteorological Agency (AEMET) and Hydraulic Service of Las Palmas. Each series has a minimum of 30 years. The application of CI requires the availability of reliable data, especially in the recordings of smaller amounts of rainfall with an intensity of less than 0.9 mm. Otherwise the value of the CI is considerably weakened. This necessitates the purging of data and the elimination of the meteorological stations that do not conform to a negative exponential distribution. An example of the different quality of the information can be seen by comparing the number of days with rain between 0.1 and 0.9 mm recorded in two nearby weather stations, Los Rodeos and Tegueste, located in the north of the island of Tenerife, during the same time period (34 years), 835 versus 37 days respectively. Sixty two of the ninety one series are removed because they did not record the daily precipitation correctly.

Their location in the territory of the series was an important factor when choosing the series, especially in relation to its altitude and orientation. The islands of higher elevation, all except for Lanzarote and Fuerteventura, traditionally differ in three main geo-ecological aspects in function of altitude: coastal, mountain slopes and summit. In general, there is no specific altitude threshold for each of them, although they do have some environmental features of their own. The most important factors in their differentiation are the topographical ones (altitude and direction), climate and soil which together determine the existence of a particular type of flora and even a historical preference in locating the settlements of the population (Ceballos y Ortuño, 1976; Sánchez *et al.*, 1985; Marzol, 1988; Máyer, 2011; Martín *et al.*, 2012).

The main objective of this work is to determine the concentration of daily rainfall by using the index proposed by Martín Vide (2004). This index is based on the percentages of the number of days with rainfall with respect to the annual total of days with precipitation (X), as well as on the percentages of the cumulative amounts of rainfall with respect to the annual total (Y). Subsequently, polygonal curves of precipitation concentration are generated in which the greatest distance to the distribution line means there is a greater concentration of daily rainfall according to equation (1)

$$Y = aXe^{bX} \tag{1}$$

The constants a and b of the equation are obtained by the least squares method, as follows (2) and (3):

$$\ln a = \frac{\sum x_i^2 \sum \ln Y_i + \sum X_i \sum X_i \ln X_i - \sum X_i^2 \sum \ln X_i - \sum X_i \sum X_i \ln Y_i}{N \sum X_i^2 - N(\sum X_i)^2} \tag{2}$$

$$b = \frac{N \sum X_i \ln Y_i + \sum X_i \sum \ln X_i - N \sum X_i \ln X_i - \sum X_i \sum \ln Y_i}{N \sum X_i^2 - (\sum X_i)^2} \tag{3}$$

with N being the number of pairs of values.

Having determined the two constants, the calculation of the area between the line of equal distribution and the observed values at each station indicates the greatest or least daily rainfall concentration. In order to do this, it is necessary to calculate the integral defined by the exponential curve between 0 and 100 of the surface between each curve, the abscissa axis and the 100 ordinate by performing the following equation (4):

$$A' = \left[ \frac{a}{b} e^{bx} \left( x - \frac{1}{b} \right) \right]_0^{100} \quad (4)$$

5000 is subtracted from the value obtained by this equation to determine the area between each curve, the line of equal distribution and the 100 ordinate ( $S'$ ). Thus, the precipitation concentration index (CI) is obtained from the following formula (5):

$$CI = \frac{S'}{5.000} \quad (5)$$

The highest value of the index implies that there is greater irregularity of daily precipitation which, in the case of the Canary Islands, is related to the orientation and altitude of each locality.

Besides obtaining CI values, the distribution and frequency of rainfall events are analyzed, which refine the different behaviour of rainfall in the different islands and mountainsides, especially on islands where the water catchment areas have a surface area less than 71 km<sup>2</sup> and the conversion of rainfall into runoff occurs very quickly (Marzol *et al.*, 2006) causing serious problems in urban areas (Máyer and Pérez-Chacón, 2006).

## II. RESULTS

### Relationship between Ni (%) and Pi (%)

In general, the rains in the Canary Islands have a weak character as the range of 1.0 to 9.9 mm is the most prevalent and groups 55% of days with rain. However, the amount of water collected with these intensities varies significantly depending on the orientation. Thus, in the northern mountainsides those days with light rain accounted for up to 50% of annual rainfall, while in the southern mountainsides this only accounted for between 12% and 20% of the annual rainfall.

Considerably heavy rainfall, of over 50 mm, is associated with the passage of cold fronts coming from strong oceanic depressions, mainly during the winter, which affect this Atlantic region with winds from the third quadrant. By contrast, the high number of days with weak or very weak precipitation on the northern slopes provide significant volumes of water to the annual calculation and these are associated with both the stratiform cloudiness of the trade winds and the passage of fronts with a marked northeast- southwest disposition, which does not affect the southern slope.

On the other hand, the altitude also introduces significant changes in the rainfall concentration. Rainfall with intensities of less than 10.0 mm are especially common on the south



coast (85%) and provide more than a third of the annual water volume, whereas on the *medianías* (the term *medianías* is a Canary term to describe the part of the mountainside which is neither the summit nor the coastal part, and is generally between 500 m and 100 m a.s.l.) of the same region these rains account for 65 % of days with rain and only provide 13% of the annual water. By contrast, the more intense rains -between 50 and 150 mm/24 h- are much more important in the latter than in the former, 9% of the days *versus* 1% respectively. And, the amount of water collected on these stormy days is half of the annual rainfall on the mountain slopes compared to only 13% on the coast. The most prominent example of this trait can be found on the islands of Lanzarote and Fuerteventura, due to their low altitude, where rainfall intensities of less than 10.0 mm account for up to 90% of rainy days and provide about half of the total annual water volume.

### CI values

The spatial differences in the concentration of the precipitation are clearer when the CI values are calculated (Table 1). The values analysed in all the stations exceed 0.63 indicating a high precipitation concentration. This means that 25% of the rainiest days in the Canary Islands provide 77% of the annual rainfall. However, some spatial variations should be noted in the CI which are related to the role of the geographical conditioning played by the orientation of the relief.

The highest CI values,  $>0.70$ , corresponding to the eastern and southern slopes of the most mountainous islands, regardless of the altitude are similar to those obtained on the coast of the Valencian Community (De Luis *et al.*, 2011; Sánchez-Lorenzo and Martín Vide, 2006). This means that 80% of the rain comes from 25% of the rainiest days. This high concentration of rainfall has direct implications such as generating erosion, rivers bursting their banks and floods.

At the summits, the CI values are slightly lower, 0.66 to 0.67. Torrential rainfall is common at sites above 1000 m altitude, so that those of  $>50$  mm in 24 hours account for only 9% of days with rain but contribute half of the total yearly rainfall. In view of the results and the low correlation between the CI and altitude, one can say that the latter is not a spatial differentiation factor, as both the coastal areas and the eastern and southern slopes have equally high values, an issue that has already been demonstrated by other authors (De Luis *et al.*, 1997).

The more moderate CI values in the Canary Islands are from the slopes in N, NE and NW of the mountainous islands and from all the zones in Lanzarote and Fuerteventura, where the value does not exceed 0.66. In the first case, this is a consequence of the cloud type associated with the trade winds that stagnates in the northern slopes, while the second is due to the lower intensity of the fronts when they sweep across the most eastern islands of the archipelago, which are also those of lower altitude.

### The duration and frequency of wet spells

Analysis of the duration of wet spells and the amount of water accumulated in each one, make it possible to refine the precipitation concentration. There are significant differences between the different islands and even between sites of the same island as a function of

Table 1  
 CONSTANT FEATURES A AND B OF THE EXPONENTIAL CURVES CO-EFFICIENT OF DETERMINATION (R<sup>2</sup>),  
 CONCENTRATION INDEX (CI) AND PERCENTAGE OF TOTAL RAINFALL WHICH COMES FROM 25% OF THE RAINIEST  
 DAYS IN 29 SITES IN THE CANARY ISLANDS (1970-2003)

Nº	Name	Island	Altitude	Orientation	a	b	R <sup>2</sup>	CI	Rain (%)
1	Mazo airport	LP	40	E	0.01082	0.04320	0.976	0.71	80.9
2	Vellehermoso	LG	220	N	0.02646	0.03493	0.992	0.64	74.9
3	Cangrejos airport	EH	30	E	0.01364	0.04034	0.984	0.71	80.0
4	Sabinosa	EH	270	N	0.02041	0.03734	0.985	0.66	76.3
5	Los Rodeos airport	TF	617	N	0.02282	0.03674	0.995	0.64	74.7
6	Santa Cruz de Tenerife	TF	36	ESE	0.00824	0.04627	0.981	0.71	80.6
7	Arafo	TF	485	E	0.01631	0.03911	0.990	0.69	78.5
8	Izaña	TF	2371	summit	0.02470	0.03514	0.989	0.66	76.3
9	Vilaflor	TF	1435	S	0.01462	0.04048	0.995	0.70	80.4
10	Airport Reina Sofia	TF	59	S	0.01892	0.03780	0.994	0.67	77.0
11	Presa de Jimenez	GC	245	N	0.02679	0.03502	0.991	0.63	73.5
12	Arucas	GC	252	N	0.03073	0.03342	0.993	0.63	73.6
13	Tamaraceite	GC	210	N	0.02167	0.03701	0.990	0.65	75.1
14	Valleseco	GC	960	N	0.01629	0.04020	0.993	0.66	76.7
15	Lomo Aljorradero	GC	1075	NE	0.02514	0.03535	0.990	0.65	75.4
16	La Pardilla	GC	45	E	0.01338	0.04149	0.979	0.69	78.2
17	Cuevas Blancas	GC	1690	summit	0.02027	0.03725	0.991	0.67	77.0
18	Pinar de Pajonales	GC	1195	SW	0.01529	0.04010	0.993	0.68	78.3
19	San Bartolomé Tirajana	GC	887	S	0.01017	0.04408	0.995	0.71	80.4
20	Gando airport	GC	20	E	0.01697	0.03899	0.985	0.68	77.5
21	Barranquillo Andrés	GC	650	SW	0.01179	0.04306	0.996	0.69	78.8
22	Berriél	GC	30	SSE	0.02088	0.03711	0.992	0.66	76.3
23	Famara	LZ	15	NW	0.03101	0.03341	0.993	0.63	73.3
24	Yaiza	LZ	155	N	0.02881	0.03438	0.996	0.63	72.9
25	Puerto del Carmen	LZ	20	S	0.02003	0.03757	0.993	0.66	76.1
26	Guacimeta	LZ	23	E	0.01988	0.03782	0.989	0.66	75.4
27	Tindaya	FV	144	N	0.02863	0.03429	0.994	0.63	73.5
28	Matorral airport	FV	23	E	0.02257	0.03601	0.990	0.66	76.3
29	Puerto de la Peña	FV	19	W	0.02535	0.03521	0.986	0.65	75.6

La Palma (LP), La Gomera (LG), El Hierro (EH), Tenerife (TF), Gran Canaria (GC), Fuerteventura (FV) and Lanzarote (LZ).

longitude, altitude and orientation (Dávila and Romero, 1993; Marzol *et al.*, 2006). Overall, between 40% and 70% of the rainy sequences occur in only one day, in which between 9% and 35% of the annual precipitation is recorded.

The sites where the sequences of a single rainy day are very important, not only because of their frequency but also because of the amount of water that they accumulate with respect to the annual total, are in the eastern islands, Lanzarote and Fuerteventura, and in coastal areas and on the lower slopes in the other islands. Thus, for example, in the Puerto de la Peña, in Fuerteventura, 70% of rainy spells are a single day and 34% of the annual precipitation is accumulated on these days. By contrast, the rainy sequences of a single day are rare in northern slopes and summits. This is the case of Los Rodeos, where rainy spells of a single day account for 39% and accumulate only 7% of the annual precipitation. The cloud form associated with the trade winds is responsible for the high number of days with drizzle which, nevertheless, provide much less water than the Atlantic storm fronts. These discharge precipitation over two or more days and considerable amounts of water are collected in these periods. It is precisely in these sites which are exposed to the fronts where there are the longest rainy spells, sometimes being more than 20 consecutive rainy days. Example of this are Sabinosa (23 days, from October 28 to November 19, 1983) and Los Rodeos (22 days, from December 30, 1977 to January 20, 1978), in both cases 228.6 mm and 226.9 mm of water were collected respectively.

As regards spells of two consecutive rainy days, the differences between the slopes are less, such that their frequency in the southern zones is 28% providing 25% of the total annual rainfall while the northern zones account for 22% of rainfall events and 20% of all the yearly rainfall.

In conclusion, the daily analysis of precipitation confirms that high irregularity and rainfall concentration are two very characteristic features of rainfall in the Canaries. Moderately high values of CI prove this and indicate that on a few rainy days, a significant percentage of all annual precipitation is accumulated. However, the irregularity of the rain is not the same in all the islands, not even in one island, therefore when any analysis performed with this climatic variable consideration of the factors of orientation and the altitude of the relief as well as the location of each island in the archipelago as a whole needs be taken into account.

# EFFECTS OF SOLAR ACTIVITY AND CLIMATE VARIABILITY ON LARGE FLOODS IN SWITZERLAND

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## I. INTRODUCTION

Climate forcings and their influence on atmospheric circulation changes may have a decisive role in the generation of large floods. Nevertheless, there is no a general consensus of how these forcings influence on extreme floods (Glaser et al., 2010) and there is no a clear link between solar forcing and the physical processes that are involved in climate (Wanner et al., 2008).

The variability of large floods in Switzerland for the period 1800-2008, has been determined from an index of high summer flood damage (*INU*) that considers severe and catastrophic summer floods in Switzerland (Peña et al., *submitted 01/03/2013*). According to our prior results, the flood damage index provides evidences that the 1830-1851, 1881-1927 and 1977 to present flood clusters occur largely in phase with paleoclimate proxies and North Atlantic dynamics. Broadly, these episodes coincide with those reported from Switzerland (Schmocker-Fackel y Naef, 2010) and from some areas of the European continent such as the Czech Republic (Brázdil et al., 2006), Italy (Camuffo and Enzi, 1996) and the eastern half of the Iberian Peninsula (Barriendos and Rodrigo, 2006). However, the relationship is not so close when compared with the flood occurrences in Germany (Glaser et al., 2010). Power spectrum analysis of *INU* revealed periodicities of 2, 11 and 110 years (Peña et al., *submitted 01/03/2013*). The periodicities of so-called «100-year events» could be explained by centennial-scale solar cycles, which have also been identified in other flood records, including those in eastern France, Switzerland, Netherlands, the UK, Spain and California (see, for example, Magny et al., 2003; Versteegh, 2005; Schulte et al., 2008; 2009).

## II. AIM

The paper analyzes the influences of climatic pulsations over the past 200 years (determined from solar variability, thermal fluctuations and changes in the large-scale atmospheric circulation) on changes in flood frequency of major floods in Switzerland. In order to evaluate the patterns related to phases of high flooding frequencies in Switzerland, the study is structured according to two main objectives:

- The first aim is to establish visual correlation between high-frequency flooding phases with climatic and solar proxies and the Summer North Atlantic Oscillation (SNAO).
- The second analysis focuses on the variability of the different driving forces that generate high-frequency periods in flooding.

## III. DATA AND METHODS

### 3.1. Data

Given the aims of our research, we use three data types: the database of floods in Switzerland between 1800 and 2008; proxies referred to climate ( $\delta^{18}\text{O}$  record for the period 1800-1987) and solar variability ( $^{10}\text{Be}$  record for the period 1800-1982); and, gridded data for the reconstruction of low-frequency atmospheric circulation indices. To cover the period 1800-2008 we used the *20th Century Reanalysis V2* (Compo et al., 2011) for the period 1871-2008 and the reconstruction of Luterbacher et al. (2002) of the sea level pressure fields over the Eastern North Atlantic and Europe, to encompass the period 1800-1999.

### 3.2. Methods

The concept of risk ( $R$ ) is used to estimate the index of high summer (July and August months) flood damage ( $INU$ ).  $R$  is considered to be the product of hazard ( $P$ ) and vulnerability ( $V$ ):

$$R = P * V \quad (1)$$

Floods are classified, according to the magnitude of the damage and economic losses, in severe, very severe or catastrophic floods. The variable  $P$  is estimated by assigning an arbitrary magnitude to each category (20, 50 or 100, respectively). The variable  $V$ , defined as the spatial distribution of the phenomenon, is based on the number of cantons affected by a flood episode, so that  $V$  is assigned a value ranging from 1 to 26. Finally, we obtain by applying equation (1) an  $R$  value for each flood event. The  $INU$  is calculated, first, from the sum of all the  $R$  values on an annual resolution, and, second, by the standardization (based on the mean and standard deviation, both parameters calculated for the period 1800-2008) of all yearly values.

To analyse the influence of atmospheric circulation dynamics, the SNAO is computed for July and August by the main EOF calculated from a Principal Component Analysis (PCA)

in S-mode using the covariance matrix without applying any kind of rotation. The PCA is applied to the grid of EMSLP for the domain from 30°N to 70°N and from 30°W to 30°E for the period 1800-2008.

To evaluate possible links between flooding and short-term solar and climatic fluctuations (first objective outlined in section II), the  $^{10}\text{Be}$ ,  $\delta^{18}\text{O}$ , and the SNAO records have been plotted alongside the INU index for Switzerland. All the series are shown as normalized values smoothed with an 11-year low-pass Gaussian filter. The second objective, the variability of the different driving forces, is analysed from the databases of the different climate proxies. From the total sample of 209 years, we have created eight categories distinguishing, firstly, between the years without flooding (INU lower than or equal to 0:  $\text{INU} \leq 0$ ) and the years with at least one flood (INU greater than 0:  $\text{INU} > 0$ ); secondly, the flood years are classified into 6 different categories based on INU greater than 0.5 ( $\text{INU} > 0.5$ ), 1.0 ( $\text{INU} > 1.0$ ), 1.5 ( $\text{INU} > 1.5$ ), 2.0 ( $\text{INU} > 2.0$ ), 2.5 ( $\text{INU} > 2.5$ ) and 3.0 ( $\text{INU} > 3.0$ ) times the standard deviation (SD). Finally, the arithmetic mean of  $\delta^{18}\text{O}$ ,  $^{10}\text{Be}$ , annual average temperature of Switzerland and SNAO is calculated for the years involved in each of the eight categories. In this way, we can determine the behaviour of each of the variables in relation to the INU, according to the flood intensity.

#### **IV. RESULTS**

The relations between climate forcings, SNAO and INU are shown in figure 1. The main results are outlined below.

- Periods marked by a high flood frequency typically correspond to periods characterized by a predominance of positive  $^{10}\text{Be}$  anomalies and, therefore, correlate with episodes of low solar activity. This pattern was particularly strong during the solar minimum of 1900.
- The  $\delta^{18}\text{O}$  record from Greenland prone to the influence of the North Atlantic dynamics, provides a proxy of the temperature variability in the middle and high latitudes of the northern hemisphere. The peak clusters of the flood damage index INU can be related to periods dominated by negative  $\delta^{18}\text{O}$  anomalies, principally to the cooler pulses of the 19<sup>th</sup> and the first three decades of the 20<sup>th</sup> centuries.
- From the correlations of the different proxies, we infer that periods of decreased solar activity and low-frequency cold climate pulses have a fundamental impact on the control of major summer floods in Switzerland. Nevertheless, the non-linear pattern of flood occurrences (e.g. since 1977) needs to be related to the complex relationship between exogenic, endogenic and autogenic climate forcing mechanisms. Therefore, the investigation of flood frequencies should consider hemispheric or global changes of the atmospheric general circulation or ocean currents that affect storm tracks and air mass limits.
- We have identified a qualitative relationship between the SNAO, which synthesizes the summer climate in Western Europe, and the summer flood damage index INU. Figure 1 shows that the second, third and fourth clusters of major floods in Switzerland coincide, broadly, with positive phases of SNAO, whereas the first flood cluster is not in

phase with this atmospheric circulation pattern. However, we suggest that the origin of these flood clusters might be attributed to the location of the atmospheric action centres during the positive (or negative) phase.

Figure 1  
RELATION BETWEEN THE ANOMALIES OF INU,  $^{10}\text{Be}$ ,  $\delta^{18}\text{O}$  AND SNAO FOR THE PERIOD 1800-2008. ALL SERIES ARE PLOTTED AS NORMALIZED VALUES SMOOTHED WITH AN 11-YEAR LOW-PASS GAUSSIAN FILTER. PERIODS OF HIGH FLOOD FREQUENCY ARE OUTLINED ON THE CHART IN GREY. THE  $\delta^{18}\text{O}$  SCALE IS REVERSE

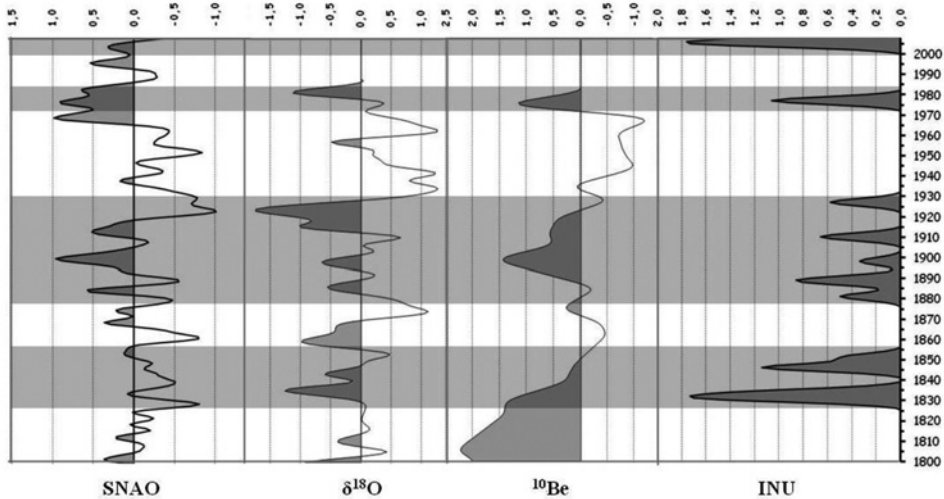


Table 1 shows the mean values of  $^{10}\text{Be}$ ,  $\delta^{18}\text{O}$ , annual average temperature of Switzerland and SNAO for the years assigned to eight categories of the INU whose thresholds were defined according to the standard deviation. From these values, we can infer two patterns of flood variability.

The first flood pattern is related to major flood events, showing a magnitude of the INU  $>2$  SD. The INU  $>3$  SD category includes the five largest floods events that affected Switzerland over the last 200 years: 1831, 1834, 1846, 1910 and 2005. These events occurred during periods of low solar activity (positive values of  $^{10}\text{Be}$ ; mean  $^{10}\text{Be} = +0.85$ ) and, with the exception of the 2005 flood, during episodes of cold climate pulses in Greenland (negative values of  $\delta^{18}\text{O}$ ; mean  $\delta^{18}\text{O} = -0.83$ ) and in the north-western Alps. During these cold pulses the accumulation of snow and ice in the headwaters is significant, increasing the flood risk during warm years when melting processes contribute markedly to summer discharge. This flood pattern occurs during positive SNAO phases (mean value =  $+0.58$ ) when depressions are usually associated with the cyclones that develop or become more intense over the Mediterranean Sea, and follow a northeast to north-northeast track crossing the Alps (Fig. 2a). This path is known as Vb and produces long-lasting, intense rainfall due to (1) the high water vapour content from the Mediterranean, (2) the orographic uplift of air masses and (3) the reinforcement suffered by negative anomalies of temperature and geopotential height that occurs at the lower and middle levels of the troposphere.



The second flood pattern is determined by INU-values with a magnitude of the INU <2 SD. These events are related to periods that, firstly, are characterized by low solar activity (positive values of  $^{10}\text{Be}$ ; mean values ranges between +0.46 and +0.70) and second, climatically cold (negative values of  $\delta^{18}\text{O}$ ; mean values ranges between -0.11 and -0.23). But unlike the first pattern, the SNAO is in the negative phase, especially as regards the category of INU <0.5 times the standard deviation (Table 1; mean SNAO = -0.23). The synoptic configurations of this large-scale atmospheric circulation mode (Fig. 2b) are characterized by cold fronts originating over the Atlantic, tracing a northwest to southeast path.

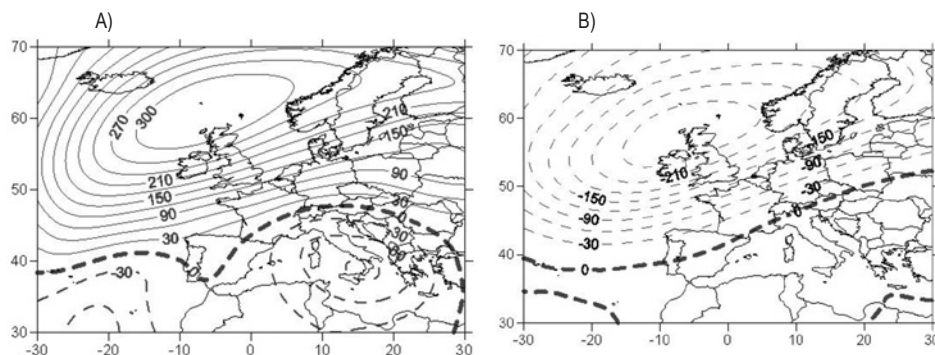
Table 1

PRINCIPAL STATISTICAL PARAMETERS OF SNAO FOR EACH OF THE CATEGORIES OF THE FLOOD DAMAGE INDEX INU WHOSE THRESHOLDS WERE DEFINED ACCORDING TO THE STANDARD DEVIATION. INU<0 IS HIGHLIGHTED IN DARK GREY

	INUi<0	INUi>0	INUi>0,5	INUi>1	INUi>1,5	INUi>2	INUi>2,5	INUi>3
Media $^{10}\text{Be}$	0.32	0.49	0.46	0.46	0.70	0.52	0.52	0.85
$^{10}\text{Be}+$ (años)	96	16	10	9	9	6	6	4
$^{10}\text{Be}-$ (años)	65	6	4	3	1	1	1	0
Media $\delta^{18}\text{O}$	0.00	-0.14	-0.11	-0.11	-0.23	-0.26	-0.42	-0.83
$\delta^{18}\text{O}+$ (años)	87	11	8	7	5	3	1	0
$\delta^{18}\text{O}-$ (años)	79	11	8	7	7	6	6	4
Media Tm	0.00	-0.02	0.02	-0.04	0.02	0.08	0.31	0.95
Tm+ (años)	91	14	10	8	8	6	6	5
Tm- (años)	93	11	8	8	6	4	2	0
Media SNAO	-0.03	-0.10	-0.23	-0.09	-0.13	0.03	0.20	0.58
SNAO + (años)	89	13	8	8	7	6	6	5
SNAO - (años)	95	12	10	8	7	4	2	0

Figure 2

POSITIVE (A) AND NEGATIVE (B) PHASES OF SNAO MODE ESTIMATED FOR THE 1871-2008 PERIOD, COMPUTED BY THE MAIN EOF CALCULATED FROM A PCA ANALYSIS IN S-MODE. WE USED THE JULY AND AUGUST ANOMALIES (NOT STANDARDIZED) OF GEOPOTENTIAL AT 500 HPA PROVIDED BY 20TH CENTURY REANALYSIS PROJECT. UNITS ARE EXPRESSED IN METRES



Finally, the enclosed area of negative anomalies of the geopotential at 500 hPa defined by the 0-meter height contour (thick dashed line in Fig. 2a) related to the positive SNAO phase,



includes both the Mediterranean and southern Central Europe (including Switzerland) and these areas are characterized by atmospheric instability. This 0-metre height contour in the negative phase (Fig. 2b) separates northern Central Europe (negative anomalies) from southern Central Europe (positive anomalies) and, therefore, Switzerland lies in the area of negative SNAO instability. Thus, extreme hydrological events in Swiss catchments are controlled by the atmospheric processes operating both in the Mediterranean area (disturbance over the Gulfs of Genoa and Venice) and in the North Atlantic (cold fronts channelled between the Scandinavian low and the Atlantic anticyclone).

## V. CONCLUSIONS

From the obtained results we suggest that solar activity (exogenic forcing) and, furthermore, changes in large-scale atmospheric circulation (autogenic forcing), influence in the occurrence of flood periods in Switzerland. It can be concluded that Swiss river catchments are situated in atmospherically unstable areas defined by synoptic patterns related to positive and negative phases of the SNAO mode. Thus, Switzerland is a real 'hotspot' affected by a number of atmospheric processes which have their origin both in the Mediterranean area (the disturbances that develop or become more intense in the gulfs of Genoa and Venice), and in the Atlantic Ocean (cold fronts funnelled by a low located at the latitude of Scandinavia and a high over the Atlantic Ocean).

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# EL CATASTRO ESPAÑOL: LOCALIZACIÓN, MORFOLOGÍAS Y DINÁMICAS DE LAS OFICINAS DE LA REGIÓN METROPOLITANA DE MADRID

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## I. INTRODUCCIÓN

Las estructuras urbanas cambian con el tiempo, y lo han hecho a un ritmo mucho más rápido en las décadas recientes; población, actividades, empleo, o edificios se crean, incrementan o reducen, se dividen o fusionan, cambiando las localizaciones espaciales en función de diferentes factores y diferentes escalas interrelacionadas. Los procesos metropolitanos recientes se caracterizan por la volatilidad del capital, por lo que ciudades y áreas urbanas se han convertido en entidades intercambiables que son forzadas a competir entre ellas (Gospodini, 2002; Halbert y Pain, 2010). Esto es debido a una extensión de las intensas relaciones interesaciales específicas de las áreas metropolitanas a superiores distancias (Sassen, 2001), al cambio de regiones urbanas monocéntricas a policéntricas (Hall y Pain, 2006; Solís y Troitiño, 2012), y a la mayor importancia y reestructuración de las actividades terciarias (Castells, 1996; De Magalhães, 1999).

Como resultado, las presentes economías urbanas en los países desarrollados son extremadamente terciarias, ya que la industria y las manufacturas han dado paso a los servicios desde la segunda parte del siglo XX, especialmente desde los años 80. Estudiar las actividades terciarias en forma de oficinas se convierte en una fuente de información crucial para entender las transformaciones económicas y espaciales de las ciudades. En cierta forma, estas actividades pueden resaltar y revelar estructuras metropolitanas reales que existen por encima de las oficiales (p.ej. áreas urbanas funcionales; Garmendia et al., 2012).

Conforme el sector servicios ha ido ganando terreno en la economía y el espacio urbano, su estudio se vuelve más interesante. Este artículo se centra en la localización, morfologías y dinámicas de los espacios de oficina y articula el problema de cómo localizarlos. Para ello se propone el uso de una fuente de información antigua pero infrautilizada para el análisis de oficinas grandes, medianas y pequeñas a lo largo del tejido urbano: el catastro y/o el registro de la propiedad.

El objetivo es doble. El primero es reunir la literatura existente en cuanto a los métodos de análisis para la localización y las dinámicas de las oficinas urbanas y metropolitanas. El segundo es demostrar cómo estos análisis pueden ser realizados utilizando los datos digitalizados del catastro, que ha sido (re)descubierto como una herramienta para obtener la localización urbana de los diversos usos del suelo. Los datos del catastro español, accesible en Internet de forma gratuita como servicio público, pueden ser descargados e implementados usando un programa SIG, resultando una manera mucho más eficiente de manejar y analizar los usos del suelo (p.ej. oficinas). Así, se construye una imagen de los bienes inmuebles de oficina metropolitanas mostrando la distribución de estas propiedades en relación a otros edificios urbanos (p.ej. residenciales, comerciales, industriales, etc.).

## II. EL EDIFICIO DE OFICINAS EN UN CONTEXTO METROPOLITANO

El edificio de oficinas, concebido en Londres en el siglo XVIII como casas de cambio, ha permanecido concentrado en el centro de la ciudad por sus necesidades de centralidad. Desde los años 80, debido a la generalización de las tecnologías de la información y comunicación, se extendió la idea de que las funciones urbanas podían ser localizadas independientemente del espacio en una difusión espacial uniforme y sin límites (Hall, 2003). Sin embargo, la experiencia ha demostrado que la ubicación metropolitana de las oficinas no se produce con este patrón difuso y homogéneo. Contrariamente, las diferentes partes del sector de oficinas se ubican en ciertas zonas metropolitanas, produciendo una nueva segregación espacial socio-económica.

Las principales localizaciones metropolitanas de los servicios a la producción se pueden reducir a tres áreas distintas (Bailly y Fernie, 1980; Sassen, 2001; Garmendia et al., 2012): (1) el centro metropolitano, a través de un proceso de renovación y rehabilitación de lugares (históricos/tradicionales) ya construidos (Mignot, 1999; Coffey y Shearmur, 2002); (2) distritos particularmente desarrollados para alojar actividades terciarias y estratégicamente localizados al lado de las actividades ya existentes, pero no en el centro histórico (p.ej. Canary Wharf en Londres, La Défense en París, Postdamer Platz en Berlín, o AZCA en Madrid); y finalmente, (3) áreas periféricas que no están excesivamente lejos del centro, algunas veces para grandes compañías o sedes empresariales que atraen otras compañías relacionadas, o viceversa. Este artículo contribuye a un cuarto tipo de localización que consistiría en (4) oficinas rutinarias que, en mayor o menor medida, se localizan por igual en todos los espacios residenciales o industriales.

En cuanto a la morfología urbana, las oficinas pueden localizarse en edificios diseñados específicamente para una actividad en particular, que se caracterizan por tener un reconocimiento relevante como el símbolo de la empresa o como el icono de la ciudad, y es relativamente fácil de distinguir. Las grandes empresas suelen utilizar este tipo de edificios (p.ej.

sede del Banco Santander en Madrid, sede de HSBC o BP en Londres, o sede de la SNCF en París). Por lo tanto, el estudio de la ubicación de las grandes empresas y edificios de oficinas es relativamente fácil. En el mismo sentido, varias empresas pequeñas pueden usar un único edificio diseñado específicamente para propósitos de oficina, que uno puede interpretar a primera vista como la localización de una única empresa de gran tamaño (p.ej. edificios de oficinas en parques empresariales).

Por el contrario, muchas pequeñas y medianas empresas pueden localizarse en edificios con usos mixtos y por tanto son más difíciles de localizar porque no son fácilmente distinguibles. En estos casos, la capacidad de reconocer la cantidad de los diferentes usos es muy relevante, porque a pesar de que una zona pueda ser «oficialmente» reconocida como residencial, en realidad puede ser una zona de oficinas que contiene muchas oficinas pequeñas dentro de edificios de apartamentos. Este artículo contribuye a este tercer tipo de morfología urbana y mejora las metodologías y el análisis de los edificios metropolitanos de oficinas, permitiendo un análisis de las oficinas en los edificios de uso mixto en las zonas urbanas consolidadas, que ha atraído muy poca atención hasta ahora.

### III. LOCALIZACIÓN, MORFOLOGÍAS Y DINÁMICAS DE LAS OFICINAS: FUENTES DE INFORMACIÓN Y METODOLOGÍAS DE ANÁLISIS

La distribución metropolitana de la actividad de oficinas debe tener en cuenta tres aspectos: en primer lugar, las *características urbanas de las oficinas*, incluida la accesibilidad, precios del suelo, disponibilidad de los edificios, la ubicación de cada uno de los grupos de población, servicios comunitarios y la percepción social; en segundo lugar, la *complejidad del sector de oficinas*, teniendo en cuenta cada uno de sus subsectores, su tamaño y estructura; y en tercer lugar, las *características de las zonas de oficinas*, incluyendo la ubicación (aglomeración frente a difusión), las superficies, y la morfología de la oficina. Los aspectos primero y segundo son comunes a la mayoría de los estudios urbanos; por lo tanto, este artículo no se ocupará de ellos. Esta sección se centra en el último aspecto, es decir, las diferentes fuentes de información y los métodos usados en la literatura para el estudio de la identificación y localización urbana y metropolitana de la actividad de oficina.

Los métodos utilizados para identificar y localizar la actividad de oficinas en las ciudades se pueden clasificar en dos grupos: los que hacen hincapié en el tipo de actividad y su tamaño (sector, empleo, producción, etc.) y los que se centran en las características del edificio (superficie, precio, etc.). El primer grupo está formado por tres fuentes de información: la localización de los trabajadores o el empleo (Coffey y Shearmur, 2002; Marmolejo y Roca, 2008), la localización de las sedes de las mayores compañías o empresas (Gritsai, 1997; Jakobsen y Onsager, 2005; Rocco y van Nes, 2005; Simmie, 2002), y el uso de fuentes relacionadas con impuestos locales sobre las actividades de oficinas (Alonso, 2001). Dos métodos comprenden el segundo grupo: la localización de empresas de servicios registradas en listas o guías de espacios de oficina en alquiler/venta o en inmobiliarias (Lang et al., 2006), y la identificación de los patrones de localización de los promotores inmobiliarios (Charney, 2007). Una vez localizadas, algunos investigadores también han llevado a cabo encuestas por correo o por teléfono sobre las oficinas (sedes) (Simmie, 2002; Jakobsen y Onsager, 2005; o Aeslen y Jakobsen, 2007).

#### IV. OTRAS FUENTES ALTERNATIVAS PARA ESTUDIAR LAS OFICINAS EN ESPAÑA. EL CATASTRO

Otras posibles fuentes para localizar áreas urbanas con determinados usos del suelo (oficinas) en España son el censo de locales de 2001, diferente cartografía, fotografías aéreas y mapas de usos del suelo, licencias de edificios, visados y el catastro. Cada uno de los métodos de localización mencionados tiene algún tipo de inconveniente, principalmente porque no son fuentes primarias de información desarrolladas específicamente para la localización de oficinas, por lo que se debe recurrir a fuentes secundarias y elegir entre ellas la que mejor cumpla con los objetivos del estudio.

Este artículo tiene como objetivo presentar una fuente de información para localizar no sólo las grandes oficinas y sedes empresariales, sino también las oficinas en edificios de uso mixto, es decir, la totalidad del espacio de oficinas en grandes regiones metropolitanas. Tras estudiar todas estas fuentes, sus ventajas e inconvenientes, se ha concluido que el catastro es la fuente que más se aproxima a nuestro objetivo de localizar la totalidad de los espacios de oficina.

En la mayoría de países europeos, el catastro recoge todos los bienes inmuebles, urbanos o rurales, incluyendo las propiedades horizontales (varios propietarios en un único edificio), y diferencia el uso actual de cada propiedad, con un fin fiscal. En general, esta información es accesible mediante solicitud a la agencia o ministerio correspondiente, y algunas veces los datos pueden ser accesibles incluso en Internet.

Además de la finalidad fiscal, la ley 48/2002 del Catastro Inmobiliario manifestaba que el Catastro «estará a disposición de las políticas públicas y de los ciudadanos que requieran información sobre el territorio». De esta forma, en 2004, el Ministerio de Hacienda puso en funcionamiento la Sede Electrónica del Catastro ([www.sedecatastro.gob.es](http://www.sedecatastro.gob.es)), una infraestructura de información espacial que ofrece la posibilidad de consultar y descargar los datos catastrales relativos a cada municipio. Esta fuente de información permite no solo localizar las oficinas por municipio sino también al nivel más detallado: la parcela urbana. Además, las propiedades pueden ser localizadas y divididas en periodos de construcción, superficie y uso. Debido a que la finalidad del catastro es la de gravar el suelo y las propiedades en función de su localización, superficie, valor y uso, la información está normalmente actualizada. Sin embargo, el valor de la propiedad no es público, impidiéndonos delimitar áreas urbanas de diferente valor, por ejemplo.

Lo que hace a esta fuente de información especialmente interesante para finalidades de investigación es la posibilidad de descargar libremente (tras solicitar un «Certificado de Acreditación de la Identidad» a través de la Dirección General del Catastro) datos alfanuméricos y cartografía vectorial de la página web, que pueden ser procesados e implementados a través de un programa SIG. De esta manera, una gran cantidad de información catastral puede ser fácilmente accesible y transformada en mapas, usando y combinando toda la información disponible.

Sin embargo, algunos inconvenientes se derivan del uso de esta fuente de información. El más importante es que los datos sólo presentan la situación actual; muestran las propiedades que en la actualidad son oficinas y cuándo fueron construidos los edificios/propiedades, pero no muestran desde cuándo son oficinas. El edificio puede ser, por ejemplo, un edificio

histórico que ha sido transformado o renovado a finales del siglo XX a uso de oficinas o sede empresarial de un banco importante. Además, para estudios históricos de más detalle, de una parcela o de una manzana, puede ser más útil acudir a las licencias o visados de edificios o al Registro de la Propiedad (García, 2005). Además, los valores catastrales de los impuestos sobre el suelo y el edificio difieren de los valores reales de mercado, y dicha información no se hace pública.

## **V. HACIENDO USO DEL CATASTRO: LOCALIZACIÓN, MORFOLOGÍAS Y DINÁMICAS DE LAS OFICINAS EN EL MADRID METROPOLITANO**

Esta sección tiene el objetivo de responder a las cuestiones planteadas a lo largo del artículo y demostrar el potencial del Catastro Español como fuente de información para analizar los usos de los bienes inmuebles. Para ello, se ha desarrollado un acercamiento bi-escalar (regional y local) y tri-temático (localización, morfología y dinámicas).

El **análisis regional** se consigue agrupando las propiedades de oficina y diversas variables por municipio. Este método revela una concentración de oficinas en Madrid, los municipios adyacentes, y las remotas capitales de provincia de alrededor. Al comparar los datos catastrales con el empleo municipal en el sector servicios (obtenido de las afiliaciones a la Seguridad Social), se observa que los municipios con mayor empleo en servicios coinciden con los que tienen más superficie de oficina. Parece como si el empleo de servicios se mantuviese concentrado en Madrid, mientras que la superficie de oficina se extiende más a los municipios adyacentes. Esto también indica que la superficie media de oficinas por empleado es más baja en Madrid que en los municipios vecinos.

En segundo lugar, el **análisis local** se lleva a cabo usando los datos de oficina por parcela. Al comparar la superficie total de oficina por parcela obtenida a través del catastro (2010) con la información obtenida por López de Lucio (1999) se puede observar que la mayoría de las parcelas con espacio de oficina del catastro también son identificadas por las licencias de edificios. Sin embargo, varias parcelas que tienen pequeños espacios de oficina en edificios de uso mixto no son identificadas por las licencias de edificios. De esta forma, el catastro es de primordial importancia para localizar intensidades de usos del suelo.

El segundo aspecto que puede ser obtenido a través de los datos catastrales es la **morfología de las oficinas**, derivada de dos variables: el número de propiedades que presenta una parcela con uso de oficinas y la superficie total de oficinas en el edificio/parcela. Primeramente, sumando el número de propiedades que posee cada parcela con uso de oficina, se puede discernir si un edificio/parcela tiene una única compañía o más de una. Si la parcela con uso de oficina tiene una única propiedad, tendremos también una única oficina o una única empresa ubicada en dicho edificio/parcela. Si la parcela con uso de oficina tiene más de una propiedad, tendremos dos situaciones: un edificio multi-oficina o un edificio de uso mixto (p.ej. oficina y residencial). Para diferenciar entre estas dos posibilidades, se sustrae la superficie total de oficina en el edificio al total de la superficie construida. Cuando el resultado es cero o próximo a cero, podremos deducir que se trata de un edificio multi-oficina. Si no, podremos considerar que estamos ante un edificio de uso mixto. Sin embargo, tenemos que ser conscientes de los usos compatibles de oficina. Generalmente, los edificios de una única empresa o de varias oficinas tienen una cantidad considerable de



aparcamiento. En este caso, los usos de oficina y aparcamiento se deben considerar como un único y compatible uso del suelo a la hora de desarrollar nuestra investigación.

De hecho, las oficinas en edificios de uso mixto, normalmente de tamaño pequeño (100-500 m<sup>2</sup>), son muy relevantes en las densas áreas urbanas europeas, muchas de ellas ubicadas en edificios construidos para fines residenciales. Este tipo de oficinas tiende a concentrarse en torno a otras grandes oficinas, beneficiándose de economías de aglomeración e incrementando la concentración de oficinas en el área (p.ej. un pequeño bufete de abogados, un estudio de diseño, un estudio de arquitectura o de ingenieros, etc.), o a la población, aunque no necesariamente en forma de servicios rutinarios de oficina (p.ej. bancos, agencias de viaje, de seguros, o inmobiliarias, etc.). Estas áreas de *terciarización gradual* son muy difíciles de identificar usando licencias de edificios u otras fuentes de información, y es por ello que no han sido detectadas en el estudio de López de Lucio (1999). Por lo tanto, el catastro es muy útil para localizar áreas de uso mixto que contienen muchas oficinas de pequeño tamaño.

El tercer aspecto importante de los datos catastrales es el análisis de las **dinámicas de los usos del suelo**. En este caso, hay esencialmente dos cuestiones a considerar: cuándo fue establecido el espacio de oficinas actual y cuándo el uso previo pasó a ser de oficinas dentro de zonas de uso mixto. El catastro ofrece el año de construcción de cada una de las propiedades que en la actualidad se usan con finalidad de oficina. Sin embargo, esta información mezcla las propiedades que actualmente alojan oficinas pero que originalmente fueron construidas para otros efectos (p.ej. residencial) con superficies originalmente construidas para uso de oficina.

## VI. CONSIDERACIONES FINALES

La literatura reciente confirma la complejidad del sector de servicios avanzados y sus actividades asociadas, que suceden fundamentalmente en oficinas y que, a su vez, adopta diferentes ubicaciones y morfologías urbanas, dependiendo de la naturaleza de la actividad de oficinas. Esta, una vez considerada como una función urbana homogénea, está abierta hoy a sistemas compuestos de diferentes sub-funciones con relativamente diferentes patrones de localización, morfologías y dinámicas, aspectos que este artículo aborda. Debido a la primordial importancia del sector servicios en la actual esfera económica global, servicios y oficinas se han convertido en conceptos extremadamente atractivos para investigadores en muchos campos. En este sentido, conforme cambian las estructuras urbanas y metropolitanas, la localización, morfologías y dinámicas de las oficinas son aspectos clave para entender dichas nuevas estructuras.

Por lo tanto, contar con fuentes de información fiables como bases precisas para el análisis espacial de las oficinas es cada vez más relevante. Históricamente, el catastro ha sido una fuente infrutilizada en estudios urbanos, lo que puede estar cambiando debido a la mayor accesibilidad del catastro después de haber sido transformado a formato digital en muchos países. Con respecto al estudio espacial del sector de oficinas, el catastro permite la identificación de cada espacio urbano de oficinas (manzana, parcela, partes de edificios, etc.), ya que permite la identificación no sólo de los edificios construidos con finalidad de oficina, sino también de los espacios de oficina integrados en edificios residenciales (u otro tipo de usos), que a veces puede ser muy importante con respecto a los patrones de uso del suelo.

El artículo demuestra cómo la información electrónica disponible en la Sede Electrónica del Catastro Español y, a su debido tiempo, otros sistemas catastrales nacionales, puede ser descargada e implementada mediante un programa SIG, proporcionando de este modo mapas útiles, fiables y fáciles de entender, a escalas que van desde la regional (por municipio) a la local (por parcela). Esta fuente también puede proporcionar mapas de la superficie total de oficinas, tamaño de las oficinas, porcentaje dedicado a uso de oficinas de un edificio, etc. Esta posibilidad permite la ampliación de la información sobre la morfología de los espacios de oficina. También es posible añadir otras variables para entender mejor la localización, morfologías y dinámicas de oficinas, tales como la población y la actividad económica de los empleados, entre otros. El mayor inconveniente de esta fuente es que a pesar de que proporciona una representación precisa de la situación actual, sólo proporciona información histórica indirecta.



# PSYCHOLOGICAL COMFORT AND TOURISM EXPERIENCE. THE VALENCIAN NATURAL PROTECTED AREAS (SPAIN) CASE STUDY

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## I. PSYCHOLOGICAL COMFORT. KEY FACTORS FOR THE ANALYSIS

The comfort is a determinant component in the achievement of a tourist satisfaction when a natural protected area is visited. This is due to comfort affects the way in which a visitor perceives the place and therefore it contributes to increase the quality of the recreational experience.

The concept of comfort is linked to the well-being of the individual as a normal and desirable state. According to Slater (1985), this concept includes physic, physiologic and psychological components. The first two are closely related to the surrounding environment; they are objective elements and affect similarly to everyone. The psychological one is more subjective because each person perceives the reality in a different way according his/her socio-demographic profile and personality traits.

In a natural protected area, the psychological comfort can be defined like a relaxing physical and mental state that allows the visitor to develop the expected recreational activity.

The main goal of this paper is to identify and analyse the factors conditioning the visitors' psychological comfort and also the satisfaction of the tourist experience in natural protected areas. Different factors affecting the visitors' comfort have been studied: Physic-physiologic factors (especially the bio-climatic and safety ones); Environmental factors (spaces or settings, recreational activities, facilities and services); and, Psychological factors in relation to the visitors socio-demographic profile, personality traits, motivations, expectations and behaviour.

A total of 2.749 surveys were done (since 2004 to 2009) among the Valencian natural protected areas in order to assess these factors. Additionally, in-depth interviews to park managers, technicians, wardens, and guides were carried out also to the key stakeholders

such as NGO members, park suppliers, neighbours, academics, local experts, among others. Furthermore, from 2010 to 2012, a number of 98 field research sessions were developed by the participant observation technic in order to know and better analyse the behaviour of the different visitors' groups (birdwatchers, cyclers, horse riders, hikers, etc.).

### **Bio-climatic and Safety Factors**

Climate is a relevant factor when developing outdoors activities. The bio-climatic comfort can be defined such as the state in which the body is willing to make the smallest effort to maintain the internal temperature. Additionally, this study has considered other health and safety climatic requirements and also the climatic enjoyment (sunny days and rain-free days frequency).

Furthermore, users must visit the place and develop the activities in safe conditions, and also they must perceive so for their peace of mind. Sönmez (1998) and Xueqing Qi *et al.*, (2009) state that peace, calm and safety are prerequisites to attract tourists to a destination.

Many and heterogeneous causes provoke unsafety to visitors in protected areas. Among the most usual ones are: natural hazards, absence or bad state of the facilities (trails, fences, signage, etc.), lack of good access and emergencies plans, etc. The sense of security is linked to the visitor risk perception. Sönmez and Graefe (1998) argue this perception can vary according to the personality traits of each individual, genre, previous experiences, and nationality, among other.

Visitors' information is essential to mitigate risk. Therefore, some safety recommendations reflected in informative signs, maps, brochures, booklets, also transmitted by the guides-interpreters will be very useful.

### **Environmental factors**

#### *a/ Space or setting where recreational activities take place*

These factors deal essentially with spatial considerations. For this reason, it is necessary to know the zoning of the area (if it exists), the spatial characteristics and available surface where the activity will take place.

Spaces could be classified into three categories: i) open spaces (beaches, forests, meadows, lakes, wetlands, etc.), ii) open spaces with physical barriers (trails, pic-nic areas, campgrounds, etc.), or iii) closed spaces (caves, eco-museums, visitor centers, etc.).

#### *b/ Recreational Activities*

There are three types of recreational activities that can take place in a natural protected area: the ludic or entertainment ones, the interpretative-educational ones and/or the sport-adventure ones. To guarantee the psychological comfort during the development of the activity, it is necessary to be sure that the visitor is developing the type of activity that fits with his/her profile, in order to satisfy his/her expectations.

Another important element to know is the Visitor Spatial Standard that is the space each visitor needs to develop an activity. This figure is closely related to the kind of activity, the visitor profile, the type of space and/or the facility where the activity takes place. In this sense, the sport-adventure activities require more space than the rest. For the ludic and entertainment ones and those interpretative-educational, that often are performed in group, the spatial reference has been those proposed in the Proxemic studies established by Hall (1963).

There are some organizational activity conditions such as touring pattern, visitation level, group size and type which are essential to provide psychological comfort to visitors.

The touring pattern prevents resources impacts and contributes to increase visitors' safety by facilitating a good access to the site (avoiding congestion and overcrowding also encounters with other groups, etc.). It also provides an easy intellectual access to the heritage by presenting orderly and sequentially the interpretative resources.

The visitation level of the site must be adequate in order to guarantee the conservation and protection of the resources; also it provides an atmosphere which visitors feel comfortable. The psychological comfort is strongly affected by the congestion and overcrowding phenomena, especially in closed spaces.

Regarding the group organization (size, visitors profile and number of encounters with other groups), it can be stated that a smaller group is more comfortable and effective because actions can be better customized and interpretation programmes can be better implemented (Moscardo, 1996). Empirical studies suggest that it should never exceed the number of ten members. It can also declare that a homogeneous group (same motivations and expectations) makes the communicative efficiency higher. There are some kind of groups, especially those highly specialized which do not feel comfortable with other visitors except with the ones sharing the same profile and motivations; also they prefer small size groups. Other visitors those more generalist profile better support group activities and despite sharing only a short period of time with peers acquire group behaviours.

According to McCool (1983), the number of encounters with other groups should never exceed ten during the recreational experience because if there were more than this it could provoke a psychological discomfort feeling.

### *c/ Facilities and Services*

Facilities are not synonymous of psychological comfort. Nevertheless there are two assumptions that should be taken into account: a/ some basic facilities are needed (welcome and information facilities, restrooms, signage, parking areas and trails); and b/ facilities in perfect state of maintenance are required.

Welcome and information facilities are the basic elements to provide trust and confidence to the visitors. Visitors feel psychological comfort by receiving geographic information such as locations and orientation to prevent visitors to be lost. Other useful information is safety and emergencies one. Recommendations in relation to the in-site expected behaviour regarding heritage resources and etiquette codes are also suggested. Signing is a key tool to provide information, orientation and interpretation, besides safety.

Trails are relevant facilities visitors use to walk from a place to another or to support interpretative routes. Trail elements affecting the psychological comfort are related to the

landscape quality where they run, the signing system and upkeep. The generalist visitors prefer good foot trails to walk, that is, not too much narrow and low slope; the sport-adventure and interpretative-educational visitors allow more difficulties (high quality landscapes, outstanding ecosystems, natural monuments, rare bird sighting, etc.). The trail layout design also influences in the psychological comfort; that's the reason winding paths offer a more appropriate atmosphere for those visitors looking in nature for solitude. This type of paths also avoids the feeling of persecution.

It is also necessary to mention that some physical and psychological discomfort problems are detected in multi-use trails, where relationships among visitors with different styles of recreation are not so good (pedestrian, cyclists, horse riders, joggers, pet walkers, etc.). In these cases is necessary to develop strict etiquette codes.

Other suitable facilities are those for supporting interpretation and education purposes in order to provide intellectual access to heritage. The more representative ones are: Interpretative Routes and Interpretation Centers.

Services can be defined as the necessary activities, actions and programmes that set up the recreational experience. This development is supported by in-site facilities and trained staff. Relationships between psychological comfort and services depend on the visitor profile and the quality of the offered service, understood as the quality as meeting the expectation or the need of the visitor. The more generalist public usually needs more facilities and services than the specialized one. The last one often obviates them, and may even negatively value an oversizing of them.

Basic services in a natural protected area are: cleaning and maintaining, waste management, first aids, and safety, besides the informative ones. Additionally, there are others for attending the needs of the impaired public. The interpretative services should be an indispensable element that visitors of a protected area deserve. If this service is offered under appropriate conditions and with good trained guides-interpreters, the intellectual access to the site can be guaranteed.

## Visitors Factors

The visitors' psychological comfort has to do largely with complicate mental processes inherent to the human beings. Needs, motivations, and expectations are those elements of the process that are forged prior to visit the site. They partially depend on the personality traits of individuals. Perception and recreational experience occurs *in situ*, and behaviours start during the visit but it is intended to become part of the visitor lifestyle.

The needs of recreation or entertainment in relation to the natural protected areas deal with very primary links that tie people with nature. Motivations are internal forces that lead a person to act to meet requirements which vary according the personality traits of the visitors. However, they can be grouped into these types: a new way of self-development, reconciliation with nature, knowledge, enjoying healthy environments and escape.

From these needs and motivations arise expectations, but it is necessary to add a new element, this is the image of the destination or tourism image. The human brain builds expectations from the information received from the site and makes a *projected* image. This image can be even created not knowing personally the site or not having been exposed

to commercial sources of information, since people throughout his/her life accumulates information related to historical, political, and economic factors shaping their own image about the destination. The information received by a potential visitor can come from various sources which are: official sources (in our case the administrations of the protected area), commercial ones (tourism services providers), and this coming from prescribers who are other users having previously visited the site. These prescribers often provide more trust than official sources.

Perception is a process which in an individual receives information *in situ* through the senses. The human brain selects, organizes and interprets this information to create a *significant or perceived image*. To give a meaning to the information that the individual receives, it is necessary to link it to previous cognitive elements (memories, ideas, beliefs, previous feelings, patterns, past experiences, etc.). So this process involves memory, learning and intelligence. At this stage, it is important to ensure a psychological comfort to the visitor as it is the last opportunity to influence the personal impression that the visitor will build about the site.

Perception includes a cognitive or rational dimension (knowledge of the attributes, resources, attractions, facilities and services, etc.), and other affective or emotional one. Cognitive information could not be misunderstood because the resources or attractions are there, but it is clear that they must be properly presented to the public and must be presented in the best state of conservation. Emotional information is subjective and can be stimulated or enhanced. Perception may vary according to personality traits, prior knowledge, experience of the observer, and cultural development of each individual as pointed by Pizam and Mansfeld (1999), and Shiffman y Lazar (2000).

The site perception can be improved by: a) keeping a good state of conservation trying to be as close as possible to the ecological and landscape integrity; b) looking for a significant sensory impact by utilizing all the senses in the act of apprehending information; c) identifying appropriate interpretive icons to each audience; d) using intangible heritage, as it is closely linked to the people and therefore to the emotions; and e) incorporating guide-interpreters in the presentation of heritage because they are the best help to visitors in order to capture the stimuli sent by nature, and also because communication between human beings is the best mean to generate emotions.

From the moment that perception begins to be forged, other internal processes shape the recreational experience. These are the result of living certain situations; therefore a very direct connection between the site and the visitor is established. During the experience process, the learning of new data occurs due to the cognitive information reaching the brain, and this can already be seen as a positive action; but also and equally important can trigger a range of emotions as we discussed.

The objective of the protected area manager has to be that visitors can learn new knowledge and also that visitors experience emotions, because, in this way, they can generate positive feelings of satisfaction, in turn, give rise to attitudes of appreciation and enjoyment for the nature.

Finally, the recreational experience is submitted by our mind to an assessment that results in a judgment on whether the performance is: exactly as expected, better than expected, or worse than expected. In the first two cases occurs satisfaction; while in the third occurs clearly dissatisfaction. Satisfaction is a feeling of well-being or pleasure that people has



when a wish or need is covered. This feeling is the result of the cognitive and/or emotional evaluation which is derived from the experience of visiting a protected area. The cognitive assessment focuses on the attributes or attractions of the site, so many authors emphasize the importance of matching the *projected image* with the *perceived image*.

The reaction linked to the feeling of satisfaction, further than a positive state of mind, is an attitude and behaviour. Certain behaviours are the last intended purpose of the managers of a protected area because are those that can contribute to the heritage conservation.

However, it can go further and consider more ambitious goals in relation to attitudes and behaviours that can transcend the time of the visit itself and influence the everyday life of the visitor. Nowadays, behaviours after the recreational experience can be reinforced through the use of new technologies (websites) and social networks because they can keep alive the feelings and memories.

Additionally, it should be noted that in-site visitor behaviour is an excellent tool for assessing the level of satisfaction and achievement of the goals outlined in the interpretation and awareness programs. Therefore, the direct observation of certain attitudes and behaviours and a participant observation method also serve as an evaluation of the visitors' psychological comfort and as an indicator of the management activity. Satisfaction is a determinant aspect of visitors' loyalty and an opportunity to recommend the site to other visitors. Therefore, if a visitor has been able to complete the process successfully, he/she will be a good prescriber of the site.

## **CASE STUDY: VALENCIAN NATURAL PROTECTED AREAS**

The previous analysed factors have been applied in the study of four Valencian Natural Protected Areas (Font Roja, Albufera, Turia and Islas Columbretes) through direct and participant observation methods, in-depth interviews to key stakeholders, as well as an amount of 2,749 in-site visitors' surveys.

As regards physical comfort elements, both the Mediterranean climate and security factors have been positive in all four cases.

Outdoor spaces analysed in this work have been: coastal lagoons, Mediterranean forests, islands and river banks. Among the outdoor spaces with barriers are included: trails, lookout towers, pic-nic areas and parking lots. Enclosed spaces have been: information/interpretation centers and observatories/hides.

As for analysed outdoor spaces, we must mention that the Font Roja, Turia and l'Albufera present open and flat (or gently sloping) areas, and not too dense wooded areas, therefore this allows some good middle ground views. Nice soundscapes complete these settings, so it can be said that these landscapes are relaxing and comfortable for most of the general public. Possibly specialized audiences would prefer a higher density forest closest to the original pristine vegetation.

The Columbretes Islands are a very open and elevated setting above the horizon that allows 360° panoramic views on the Mediterranean Sea. The sensations that cause visitors are divided between those who enjoy them as a special place far from the urbanized areas and where the only sounds come from the birds, the sea and wind. Other visitors can trigger sensations of isolation or agoraphobia with consequent psychological insecurity.

Regarding to attendance, visitors' data until 2011 inform us that the Font Roja received 59,797 visitors and 38,790 Albufera. The Columbretes Islands received 19,625, being the protected area which has experienced higher growth in recent years. Estimates for the number of visitors in the Turia River Natural Park conducted by the Universitat Politècnica de València and the Universidad de Alicante between 2009 and 2012 shed the number of 750,000 people.

The more saturated park is Turia River Natural Park, followed by Font Roja Natural Park. Prior to this work, the recreational carrying capacity of these two spaces and also the Albufera one (Viñals *et al.* 2004; Morant and Viñals, 2010) was studied, and it could be said that generally were within acceptable capacity levels of use. However, there have been specific problems in the multi-use trail of the River Turia posing bicycle traffic congestion in certain time slots on weekends and holidays. The Columbretes Islands Natural Reserve presents also congestion in some summer days. This is due to the unexpected arrival of visitors on private yachts, without having previously booked. Another situation arises saturation during special events such as the Pilgrimage of Virgen del Lliris in the Font Roja. The perception of congestion is felt with greater intensity in the Turia River Natural Park (51.2% of the visitors), but visitors said that this circumstance did not affect their psychological comfort and not have too much weight in their assessment of the place.

It can therefore state that visitor management could be improved in all parks and impacts on resources could even be minimized by managing recreational carrying capacity. This would improve the visitors' perception of the space and thus help to increase their psychological comfort.

Regarding recreational activities, it should be noted that the most practiced ones in the Font Roja, l'Albufera and Columbretes Islands have been the concerted-guided interpretive educational and also those ludic and entertainment ones (except the Columbretes Islands where only concerted visits are allowed). These last are mainly represented by outdoor walks. In Turia River Natural park the most common activities are those of entertainment, and also the sport and adventure ones, carried out individually or in self-organized groups. In this park, walking is the most popular activity with 70.6% of responses because users live close to this green corridor. The next group and experiencing the strongest growth, is those of cyclists with 64.2%. The reasons for the high presence of cyclists are related to the adequacy of the path for the practice of this activity. Horse riding is also practiced in this space (3.3%). Since 2013, this green corridor was inventoried as a National Equestrian Itinerary (IE-031) by the Spanish Equestrian Federation. Visitors frequent this place at intervals of 2 to 4 times a week (52.5%) because they live in the nearby towns. It can be stated that this park acts as a «proximal space for recreation».

As for facilities and services, it should be noted that the basic facilities are not guaranteed in these protected areas. There are sufficient number of marked, non-motorized and save trails but they are not interpretive. The touring pattern is linear in most cases. The signs of all the parks are, for the moment, insufficient and incomplete causing occasionally feelings of psychological discomfort and insecurity in individual visitors. It is remarkable that all parks have visitors' centers.

The information and interpretive services are those contributing most to meet the cognitive expectations of visitors. It should be noted that there is information available to visi-

tors on the official website of the regional administration prior to their visit. In the parks themselves are brochures and occasionally informative panels with accurate information, providing a projected image quite adequate to the reality of each park, which helps to create expectations with a realistic chance of being satisfied during the visit (perceived image). Interpretive exhibitions in these centers are old and upgradable in all cases. In relation to interpretive services, it must be commented that the staff dedicated to these services (guides-interpreters and monitors) has been in decline in recent years with the consequent damage to visitors. Consequently, the emotional component of the visit is neglected.

Regarding the socio-demographic profile and personality traits of the visitors, it can be said that general visitors have a medium-to-high perceptual capacity; that is, they are not too demanding in terms of space requirements to conduct recreational activities, and also they tolerate the presence of others while not reached saturation.

The most common type of visit is concerted: schoolchildren in working days, and families during the weekends. In the Columbretes Islands, there is a concerted fit of 2-3 groups of 20 people per day, although it is quite complex to monitor. From Turia River Natural Park, it is known that the visitor-type shows certain features of specialization towards sports and adventure. So, it could be defined the profile as: male (63.3%), between 36 and 50 years (36.9%), working in the services sector (46%, 0%), and with a high educational level (36.1%). Most visitors concentrate on the weekends or holidays. Runners and cyclists have a peculiar personality traits characterized by a remarkable vigorexy.

Among the motivations that stimulate a visit to these protected areas, according to the answers and free comments used in questionnaires, it could be highlighted: the «break» and «contact with nature». The Turia River visitors are also motivated by a «personal growth (overcoming spirit, physical achievements, etc.). In the Albufera and the Font Roja, the thirst for knowledge seems to be the motivation of organized groups.

Derived from surveys conducted by the managers of parks, it is observed that the expectations of the general public and specialists have been satisfied after the visit. This merit, it must be attributed largely to the spaces themselves who hold great beauty and very attractive and unique resources. It should also be mentioned that projected image according the information provided and final perceived image meet too much, even perceived image was better than expected. Respondents showed a medium-high level of satisfaction in 84.10% of cases in the Font Roja, a 70.63% in the Columbretes Islands, and 76.9% for the Turia River. From these results, it can be deduced the intention of returning to visit the park and recommending it to others.

## **CONCLUSIONS**

In view of the above, it can be highlighted the need to pay particular attention to the factors that influence the psychological comfort as they are closely linked to the satisfaction of the recreational experience. Thus, it is very important that not only protected natural areas are perfectly preserved and managed from the ecological and/or cultural point of view, but the administration of these sites should go further and worry about visitors in order to have a good physical and intellectual access, providing them a quality and satisfactory experience as much as possible, so that to create positive emotions and feelings that lead them into attitudes and behaviours increasingly committed to the conservation and protection of the heritage.

The psychological comfort cannot be understood as a standard applicable to all profiles of visitors but varies a lot with the socio-demographic characteristics and personality traits of each individual as well as expectations about the recreational experience to perform. Managers of protected areas must provide psychological comfort to visitors even before the visit, when the projected image is forging, as this is crucial for the generation of expectations about the site. However, it will be inside the site when it should make every effort to make the experience successful and so the attitudes and behaviours expected of visitors are achieved. The psychological comfort should be a concept that is associated with the quality of the experience.

Regarding satisfaction of the recreational experience in the case studies analysed, it can be stated that the general public is the easiest to satisfy in terms of psychological comfort. It can be also be concluded that, despite the positive assessment of recreational experience, the study of the four natural protected areas allows us to suggest that psychological comfort of visitors can be improved by enhancing emotional stimuli.



# URBAN AIR QUALITY MODELLING. A METHODOLOGICAL EXPERIMENT BASED ON SPATIAL INTERPOLATION TECHNIQUES

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## I. INTRODUCTION

Air is a vital resource and air pollution can be harmful to human health and the environment. Therefore, for years now, the quality of the atmosphere and its protection has become an essential goal in environmental policy. Industrialization and urban land development processes have led to the degradation of air quality, making atmospheric pollution in cities a universal public health problem and one of the world's first priorities according to the World Health Organization (WHO).

It is patently clear that knowledge of local pollution levels, in particular in the interior of cities, is insufficient owing to the limitations deriving from the number and the spatial distribution of monitoring stations. Overcoming this situation requires spatial estimation instruments, which constitute a major branch of scientific development in the field of earth sciences. It is envisaged that, with these, and from a sample of empirical observations, estimated values can be obtained for the locations lacking such measurements. In this regard, however, several problems arise when applying conventional spatial interpolation. These may originate from causes such as a particularly biased distribution, an insufficient number of sample points, an inadequate sampling scale, i.e. the spatial variability of the phenomenon occurs at a considerably higher spatial scale (that is to say, at smaller distances) than the sampling scale (that is to say, with greater distances between sampling points), etc. All these are liable to give – as, in fact, has been shown in some cases – an insufficient basis from which to reach successful and credible estimates. Spatial interpolation techniques can be considered as simple, but at the same time sophisticated, tools. They are simple from a conceptual point of view, if we consider the number of variables or factors that make up the interpolation formula. For example, in the case of air pollution, we can mention those referring to time and the associated atmospheric stability/instability, winds, spatial dispersion of emissions mechanisms, etc. This places certain limits on their capability. At the same time they are

sophisticated, partly on account of their mathematical formulation of uneven complexity, and partly, and more importantly, because they require meditated (non-automatic) decisions to specify a great many of the parameters in the formulas, whose influence on the results appear to be decisive. Therefore, intelligent handling of these techniques is essential, since many implicit factors must be subsumed which impact the spatial phenomenon being estimated. Spatial estimates are difficult to validate, except at the sparse sampling points.

Processes for the generation of spatial patterns are complex, in addition to which the mechanisms operating in each type of process are highly specific. To refine the estimating capacity, therefore, a thorough empirical knowledge of the phenomenon and of the relevant geographical environment is needed, so that the results can also be evaluated with contextual or qualitative criteria.

In view of the above, it seems advisable as a general aim to work toward establishing procedural protocols to improve estimates, given the adverse circumstances at the outset. This paper describes a strategy designed to estimate the concentration of nitrogen dioxide (NO<sub>2</sub>) in the atmosphere at two Spanish cities with very different environmental conditions: Barcelona, with serious pollution problems, and Santa Cruz de Tenerife, with a good quality environment.

## **II. BACKGROUND AND CURRENT STATUS**

This article forms part of a line of research on air quality in cities and the socio-environmental injustices deriving therefrom. Within this framework a number of methodological issues are studied, such as the comparison of results from interpolation methods, analysing the differences and similarities arising from the spatial patterns obtained with different techniques, assessing their degree of reliability and determining the most appropriate among them, applying both statistical and geographical criteria.

Many authors have compared different interpolation/spatial estimation methods, taking into consideration the most influential factors: sampling density, spatial distribution of samples, grouping, surface type, data variance, normality, target spatial resolution, etc. Other authors have recorded the diversity of distance radii adopted to generate estimates at new points, based on data from monitoring stations, and the variable number of stations included in the calculation formula or issues related to the exponent affecting distance.

One crucial difference in interpolation methods is the manner of determining sample point weighting. If determinist methods are used, such as for instance inverse distance weighting (IDW), weighting will depend on the distance between monitoring stations, raised to an exponent that is arbitrary and independent with regard to the data, although in reality no such lack of definition exists since this value depends on factors such as orography, prevailing winds, etc. that condition the concentration of pollutants. Conversely, Kriging, an optimal interpolator, uses the semivariogram to determine weights which depend on the spatial autocorrelation statistics of the sampled data set; the weights, therefore, depend on the values of the actual data.

The work plan consisted of the execution of a series of experiments, according to a selective trial-and-error strategy which aims to achieve, after a limited number of operations, acceptable technical and environmental results from the available data.

### III. DATA AND METHODS

#### 3.1. Data sources

The environmental data for Barcelona were provided by the *Xarxa de Vigilància i Previsió de la Contaminació Atmosfèrica (XVPCA)* [Air pollution surveillance and prediction network], which is dependent on the *Direcció General de Qualitat Ambiental, Departament de Territori i Sostenibilitat de la Generalitat de Catalunya* [Directorate General for Environmental Quality, Department of Territorial Affairs and Sustainability, Regional Government of Catalonia], while the data for Santa Cruz de Tenerife were provided by the *Consejería de Educación, Universidades y Sostenibilidad del Gobierno de Canarias* [Department of Education, Universities and Sustainability of the Regional Government of the Canary Islands].

The selected environmental variable was the mean annual concentration of NO<sub>2</sub> for the year 2010 in Barcelona, and for 2012 in Santa Cruz de Tenerife. We note that the mean annual rate permissible under Spanish, European and WHO regulation is 40 µg/m<sup>3</sup>. The basic digital cartography used consists of the spatial delimitations established by the INE [Spanish National Institute of Statistics] for districts and municipalities. The analysis, however, is restricted to the areas described as «urban populated zone», excluding manifestly non-residential and undeveloped urban territory.

#### 3.2. Methodology for air pollution spatial interpolation

To meet the aims of this study, a procedure has been designed comprising several stages. In the first stage, an exploratory spatial analysis of the pollution sample data is carried out to obtain measures of location, spread and shape.

In the second stage, the data are subjected to a structural analysis by means of building a semivariogram, to reveal whether semivariance changes only with distance or also as a function of direction. The objective at this point lies in obtaining a series of statistical results such as range, sill and nugget, and to identify the directions of maximum and minimum spatial continuity. In this second stage we have also used, as an exploration tool, a global polynomial interpolation (GPI), which provides orientation on the general spatial pattern of the variable.

In the third stage in this analysis, both of the selected interpolation methods are applied. The first of these, deterministic, precise and local, applies inverse distance weighting (IDW). The second method, geostatistical and analytical, applies ordinary Kriging, taking into account the spatial autocorrelation of the interpolated variable. The aim at this point is to compare the results and determine their reliability, adopting conventional statistical criteria, such as goodness of fit, and other more qualitative geographical criteria.

These techniques were implemented by means of the ArcGIS Geostatistical Analyst 10.1 extension. The final goal was to elucidate which interpolation method gave fewer errors and, at the same time, presented a spatial distribution of the pollutant most compatible and coherent with the territorial framework and local urban structure.

The results of interpolation is a geostatistical surface that must be converted to a raster image, having selected a resolution of 50 m. Subsequently, and using map algebra, the raster layer is fitted to the layer representing the populated urban zone. The same statisti-



cal data describing this fitted interpolated layer will be used in the next section to check and evaluate the degree to which the predicted NO<sub>2</sub> values match those actually observed.

## IV. ANALYSIS OF RESULTS

### 4.1. Case study: Barcelona

The univariate description of mean annual nitrogen dioxide levels in Barcelona show a high concentration of values observed close to the average value, which explains the high kurtosis value. Its coefficient of skewness is positive, although with two distinct tails representing the lowest and highest values in the series. Likewise, data distribution is not normal and shows a trend toward greater values near the central part of the municipality, which decrease from the centre outwards due north, south, east and west.

The semivariogram surface confirms that the semivariance of nitrogen dioxide data in Barcelona presents spatial differences, both as a function of distance and as a function of direction. It can be observed that levels are higher in the central area and decrease toward the northeast and southwest. The use of GPI allows the anisotropic behaviour of nitrogen dioxide in Barcelona to be spatially determined, on the basis of the data registered at the monitoring stations.

The implementation of preliminary exploration techniques has corroborated the anisotropic behaviour of NO<sub>2</sub> in Barcelona: in other words, that in a given direction, generally NNE-SSW, the variable demonstrates greater spatial continuity, while in the perpendicular direction, WNW-ESE, spatial continuity is smaller. This means that the differences in semivariance in the second case are considerably sharper at shorter distances. The reasons for this behaviour in the case of Barcelona appear linked to the topographical features of the city, located on a lightly sloping platform enclosed between the sea and the Sierra de Collserola mountains to the northeast, with prevailing winds from the north aiding the dispersion of pollutants further along the axis of greatest spatial continuity.

Implementation of the Kriging technique showed that anisotropic Kriging yielded better results, not only in validating the model, but also the spatial configuration of the pollutant. None the less, the greater homogeneity produced led to an increase in the distance between the estimated and the observed mean values.

The IDW technique revealed that the anisotropic model yielded results that were closer to the local geographical situation, as well as estimates that match empirical values more closely.

Lastly, mean squared prediction errors were fewer with IDW than with Kriging, which further endorses the former interpolation method.

An examination of the most representative maps resulting from interpolation, using IDW and anisotropic Kriging techniques, shows a great extension covering most of the centre of the city and its port area containing the highest concentration levels of NO<sub>2</sub>, exceeding 46 µg/m<sup>3</sup> and reaching 63 µg/m<sup>3</sup>. This area includes the quarters of Gràcia and part of St. Gervasi, traversed by major avenues carrying heavy traffic, such as Ronda General Mitre, Vía Augusta, Travessera de Dalt or Avenida de la Diagonal. We must also mention the pollution produced by the industrial activity located in the city's port facilities. In this sector, pollution levels diminish gradually, with values in the range of 40 to 46 µg/m<sup>3</sup>, both toward the NE

(Poblenou) and the NW. The least polluted areas (values below  $40 \mu\text{g}/\text{m}^3$ ) are Vall d'Hebron and Torre Girona, a buffer zone comprising residential areas and large green spaces between the city and Sierra de Collserola.

#### **4.2. Case study: Santa Cruz de Tenerife**

The  $\text{NO}_2$  data present very little variability. Their distribution is practically symmetrical, platykurtic and closely resembles normal distribution. The semivariogram surface confirms the spatial differences in semivariance in function of distance and direction. The lowest semivariance values lie on a NW-SE axis, while from the centre of the municipality these values increase toward the NE and the SW. First-degree GPI and the theoretical adjustment of the semivariogram confirm the anisotropy behaviour of mean nitrogen dioxide levels in the municipality of Santa Cruz de Tenerife.

The anisotropy Kriging method showed better results, both in validation of the model and in spatial configuration. However, it smoothed the predicted values, increasing the difference between the observed and the estimated values.

The results obtained using anisotropic IDW techniques presented a slightly higher rate of mean squared errors than those obtained with the Kriging techniques. The average of the data calculated by all models was very similar and close to the observed mean value. The highest discrepancy rate occurred in the maximum and minimum estimated values, while IDW produced a better adjustment between observed and estimated values, and Kriging reduced the maximum values and increased the minimum values, producing a greater smoothing effect.

The spatial configuration generated by anisotropic Kriging and IDW was fairly similar, although the surface deriving from IDW presented a slightly higher frequency of spatial incoherencies than from Kriging, which together with higher RMSE values makes it difficult to give it precedence over Kriging. The main drawback to Kriging is that it presents greater smoothing effect. In summary, the criteria do not warrant a clear choice.

In both cases, the estimated values indicate a convincing overall NE-SW orientation, confirmed on calculating the anisotropy.  $\text{NO}_2$  values decrease from the coast toward the NW, and continue to decrease the greater the distance from the city centre and the greater the altitude.

## **V. CONCLUSIONS**

This paper examines a crucial aspect of environmental studies, namely the estimation of pollution values at locations for which no measurements are available, from a sample of empirical observations performed on a series of points or stations, using spatial interpolation techniques. In the study, we have tested a procedural protocol to assist technical decision-making in order to improve such estimates on urban pollution on the basis of insufficient data, at affordable costs.

From a methodological viewpoint, the work has been structured into three stages, each contributing toward the common goal. In the first stage, univariate distribution of the sample data was explored with several tools, and research was conducted on the existence of anisotropic behaviour in the spatial distribution of  $\text{NO}_2$  by means of the semivariogram, which assumption was confirmed.

In the second stage, sample data was subjected to structural analysis through the use of two complementary techniques: on one hand, the adjustment of a function over the empirical semivariogram, to calculate objectively the spatial anisotropy parameters for NO<sub>2</sub> pollution. In particular, the techniques yielding the most satisfactory results for Barcelona were: ellipse dimensions 9000 m by 5000 m, orientation 30°, between 6 and 4 neighbours to include, and the ellipse divided into four 45° sectors. For the city of Tenerife, the best parameters were: 15000 m and 3000 m for the axes of the ellipse, orientation 43°, between 7 and 4 neighbours to include, and the ellipse, as for Barcelona, divided into four 45° sectors.

To the above we added the use of GPI (or trend surface analysis) to reveal the overall latent trend in the spatial distribution of the pollutant. Both intermediate results had considerable weight in the methodological decisions taken in the following stage.

In the third and final stage two distinct interpolation techniques were employed: IDW and ordinary Kriging. The resulting statistics made it possible to validate the resulting models and to compare the spatial patterns of NO<sub>2</sub> pollution.

The spatial patterns generated presented some notable differences, although the most similar were those yielded by anisotropic IDW and Kriging. In choosing between these two options, on the basis of statistical and qualitative criteria, the anisotropic IDW solution would be the more favourable choice for the city of Barcelona and, less clearly, the anisotropic Kriging solution for Santa Cruz de Tenerife. Both solutions were obtained by means of systematic trials, in which acceptable (but not necessarily the best) goodness of fit indicators were combined with estimated values that were more coherent with the urban structure and the territorial framework.

To sum up, it is worth pointing out that the difficulty in generating estimates for pollution levels over a complete urban space, when data are sparse and limited in their territorial representativeness, can be offset by making intelligent use of a set of analytical and spatial modelling tools. With a procedure such as the one adopted in this study it is possible to progress, on a more solid ground, toward a more comprehensive knowledge of local pollution patterns, which subsequently facilitates their insertion in studies and policies dealing with quality and environmental justice, morbidity and environmental health, socio-environmental discomfort, sustainability, etc.

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# CHALLENGES AND UNCERTAINTIES ABOUT A SUSTAINABLE LAND USE: A EURO-LATIN AMERICAN PERSPECTIVE

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The major changes observed in the practice of Land Use Planning (LUP) should not be understood as a notion immutable but open to renewal of approaches and paradigms related with the modification of the context in which they were made and the actual sensitivities of the environment in which their actions are carried out. Hence the need to assess the significance of the debates that have made of the LUP policies a question permanently open to controversial issue, allowing lighting ideas, approaches and methodologies that affect the formation and attitudes of the public opinion while undergoing revision strategies and decision-making by the organs of power in line with the renewal of the paradigms that the mechanisms of government and land management in their temporal evolution. For that reason are very important the interpretation of the trends observed in the deployment of territorial policies that covered the programmatic and strategic principles of the «sustainable development» are of explicit authority in the plans and programs of action advocated by government engaged in the application of these principles in their respective areas of responsibility. Its proper relationship to the territory is essential since it depends on the notion that this exceeds its testimonial character to acquire the operational and applied reference dimension that brings the realization that he is through as it is possible to achieve an effective materialization of cross-cutting relationships between social, economic and environmental dimensions of sustainable development which is founded. Here was a major challenge for Geography, considering his status oriented analysis and interpretation of spatial logics, that transform the land and build the landscape discipline, and as an expression of a scientific approach that support with the necessary rigor the decision making sensible with the defense of the quality of socio-economic and territorial environment in which they apply. For a better approach to understanding the impact of this approach, reflection focuses on three key aspects: On one hand, it should be emphasized that since the nineties of the twentieth century attends the explicit claim to a wealthy territory management criteria associated with sustainability. On the other, it emphasizes the importance of governance mechanisms arising directly or

indirectly from this rich and complex institutional support. To relate these basics to what happens in a territorial reality in continuous metamorphosis is a necessary intellectual exercise when trying to find a clear explanation of the panorama ambivalences and contradictions that characterize the application of the principles of sustainability in a scenario characterized by the conflict of interest, by the contradiction of perspectives and review of strategic priorities such as Land Use planning. To better understand the meaning of these trends is expressive comparative experience as it helps to interpret the nuances and contrasts observed performance in different scenarios while facilitating the understanding of the analogies between them are also produced. Thanks to the importance of historical, political, cultural and geostrategic links between them is interesting knowledge of the guidelines around this issue have marked the history of territorial policies undertaken in the European Union and Latin America.

## **I. TOWARDS SUSTAINABLE LAND MANAGEMENT: GLOBAL AWARENESS AND POLITICAL DECISION**

Considering the controversial positions the concept of sustainable territorial development causes, it is clear that their assimilation into the political sphere has led to the accepted it as one of the central ideas in all lines of government action to define a substantial part the sense given to public action and an argument for a new way of understanding relationships and responsibilities on a global scale. A clear manifestation of this position in favor of incorporating the dimension of sustainable development in its areas of land management and resources offer the European Union and Latin America, whose account reveals a commonality of objectives and strategies consistent with links built between the two regions under the flow of information, advice, multidimensional cooperation and exchange of experiences that take place in time to the process of building the integrated area of the accession of Spain and Portugal to the European Communities in the mid-eighties. In the case of the European Union, the essential steps will be marked by the momentum after the Single European Act (1986), coinciding in time with the defense of the principle of economic and social cohesion, recognizing explicitly the question environment within common policies and subsequently reaffirmed in the Treaty of Maastricht (1992), although it will be in the Arts. 1 and 2 of Treaty of Amsterdam (1999) when sustainable development as a key objective of the Union is recognized and committed to develop a long term strategy proposal through harmonization of policies assumed in this direction. The adoption by the European Council in Potsdam (1999) of the European Spatial Development Perspective (ESDP) marks a key in the process of formalizing the objectives that give substance to the claim to achieve, and long-term vision, an overlap between spatial planning and sustainable development, inscribed on the policy of economic, social and territorial referred to in Article 158 of the Constitutional Treaty cohesion subsequently ratified in Art. 174 TFEU. Within this climate of support for proposals for intervention in the territory with sustainability criteria include the European Landscape Convention, sponsored by the Council of Europe and ratified in 2000. Special mention deserves the resolution adopted by the European Commission on May 15, 2001 concerning the adoption of a strategy for sustainable development, composed of seven goals with decisive implications from the point of socio-economic and territorial view. Simultaneously it's possible to see in Latin America the progressive development of a similar sensitiv-

ity, raised on the basis of state actions, despite the absence of a supranational entity backbone as in the previous case, obscures traits and tendencies of a susceptible overall interpretation, applicable to the whole region. A contributing decisively impact caused by the Earth Summit (1992), responsible for a decision fairly widespread awareness that leads to incorporate the concept of sustainable development in government posts to be reflected in numerous documents, statements and action plans to throughout the last decade of the twentieth century. In this process has importance the support offered by the programs sponsored by the Inter-American Development Bank in the nineties led to the adoption of measures by the United leveraging loans specifically for this purpose (development projects sustainable, in environmental impact assessment, pollution control ...) without forgetting the contributions associated with cooperation programs found accommodation in the framework of bi-regional strategic partnership forged between Latin America and the European Union, with all that it has represented facing the incorporation of a renewed way of understanding the inter-linkages approach, in which commitments to environmental issues occupy a prominent position. The nineties and especially in the first decade of the century takes place in Latin America a qualitative leap towards Planning, gradually accompanied with the connotation of «sustainable», which grows into a recurring adjective. This concept will be used in urban policies, coinciding with its reorientation in line applied to territorial policies, with implications from the perspective of changes in local government and in the modification of municipal organization charts, the compass administrative reforms (decentralization, recognition of the principle of local autonomy).

## **II. COORDINATION OF THE STRATEGIES, NEW MODELS MANAGEMENT AND RELATIONS BETWEEN CHANGES IN KNOWLEDGE, POWER, SOCIETY AND TERRITORY**

According to the similar aims and promoted under the premises of an environment that guides decisions in this direction, instruments of various types, structure and level of efficiency targets have been present on the international scene in time to the resonance achieved by the notion of interest in sustainability and consolidate as a key idea from the operational point of view. From a global perspective is necessary to highlight the role assigned in both scenarios to Local Agenda 21, arising from the desire expressed in chapter 28 of the Rio Summit, which explicitly calls upon the government to proceed with the development strategic documents focused on the determination of guidelines related to the achievement of a sustainable development model. The emphasis placed on the importance recognized in this regard to municipalities confirms the trend towards a new representation of the territories that encouraged by the possibilities inherent in the local and the quality of their own management tools, planning, public participation and multi-agent coordination , contribute to sustainable development that democratic legitimacy is not reached within broader decisional levels. In this scenario, we must recognize the scale of the initiatives undertaken in the European Community area consistent with the approach in question. It is the goal that inspires the European Spatial Planning Observation Network (ESPON), whose essential work has been to promote, through research and the establishment of criteria and comparable indicators, the development of public policies attuned to the objectives of territorial cohesion and the «harmonious»

development of the European territory. Similarly should refer to the adoption in 2000 by the Council of Europe's European Landscape Convention (2000), whose ratification by the States implies a quantum leap from the point of view of law and in the enrichment of social debate and cultural. And, while it is unfortunate the closure in Spain in 2013 the Observatory for the Sustainability, after a fruitful activity stage, should not be ignored to ignore the reference of Grenelle Law (2007) in France resulting in the formation of one of the most important structures - the Grenelle Environnement - how many have been created in the EU for sustainable development. And in the Latin American context highlights a structure to support public policies related to environmental management and planning. It is sufficient to recall in this regard the agencies specifically created by various countries in the region for this purpose. Special mention deserve the Environmental Commission of the Amazon (1989) or the development of the Sustainable Amazonia Plan, drafted in 2003; the creation of the Alliance for the Sustainable Development of Central America (1994), the Regional Forum of Land Management –defined as «the fundamental support for sustainable development and poverty eradication»– or the American Conference for State Decentralization and Local Development (CONFEDELCA). Recall also the Latin American and Caribbean Initiative for Sustainable Development, presented as the expression of the desire to promote «the ethics of sustainable development. From it comes the initiative, presented at the Fourteenth Meeting of the Forum (Panama, 2003), to develop a project for the establishment of indicators to correct the limited availability of environmental data in the region. And in line with this process is interesting work by ECLAC, thanks to its methodological effort to improve quantitative analyzes that are to be supported public policy. We refer to the Computable General Equilibrium Model (CGE) , which allow for rigorous diagnostic prior to decision making through integrated socio- economic and environmental analysis variables. These references provide evidence not only for the state of affairs that is organizationally Euro-Latin American trajectory towards a sustainable pattern of land use, but also the level of maturity reached in the scheme of relationships, around this concept and its practical application .The contributions made it possible to establish the linkages between the different elements of the structure of the paradigm. And although it's obvious that in their spatial specificity can present nuances, contradictions and even disappointments, do not invalidate the characters in a consolidated trend, built on the basis of common guidelines, which give the dynamics of the territory from the perspective that derives from the logic of sustainability organized according to the interrelationships structured in Figure. Such structure is based on four key elements: advances in knowledge of the territory and the correct interpretation of the logic model or organize it; the importance of socio-environmental programs that provide education to society the elements necessary to strengthen their sensitive and caring, attitudes related to key issues of the environment in which it operates; strengthening citizen participation, in tune with the principles established by the Conference of Aarhus; the proper functioning of multilevel cooperation mechanisms that articulate their powers within a frame of shared interests and responsibilities.

### **III. A PANORAMA OF POSSIBILITIES, INSUFFICIENCIES AND CONTRADICTIONS**

With the available perspective can be said to understand and apply the concept of sustainable development is not easy, despite the importance and density of the regulatory framework



is give an operational role - within that controversial and uncertain relationship established between standards and results - has reached an extraordinary dimension. It can be said that if the policy for sustainability will constitute a warranty on which to base a horizon of favorable expectations, the exercise of power is always faced with a challenge that can not be addressed if not kept firmly positions justifying the initiative taken in a context dominated by situations and likely your question or denaturation factors. Hence, when we analyze the behavior of the agents responsible for the action on the most important territorial level, as is local, we found a panorama that appears characterized by ambivalence in both the European Union and Latin America, because there are meritorious achievements and significant deficiencies. We note two in particular: on the one hand, a tendency among interested and use the restrictive interpretation of the concept of sustainable territorial development; on the other hand, a crisis or weakness of territorial culture in settings affected by conflict, tension and impacts. Indeed, and as regards the first point, it is not uncommon that there are significant limitations as essential as is the interpretation itself, by the different actors responsible, the concept of sustainability in its territorialized dimension aspect. Commonly, it incurs a kind of repeated confusion, which leads to confusing and even contradictory perceptions, thereby hindering the quality and effectiveness of decisions. Adopting a more prone to recognition as a useful media stance that the actual incidence of the initiatives taken in this regard sometimes move in the field of advertising and promotion declarative. Similarly the restrictions from the operational point of view resulting from a conception of sustainable development referred merely from an environmental perspective it should be noted. And as regards the second argument, the available experience shows that two main threats affecting, from the point of view of governance, on the treatment of territorial transformations from sustainable perspective. The first has to do with the absence or weakness which often presents the territorial culture, understood as the manifestation of the level of knowledge and awareness of decision makers and society itself have territorial reality, considered in the their activities, behaviors and relationships unfold. When that consciousness is reduced or distorted by the defects, omissions or errors in the information, a framework of troubling prospects commonly result in harmful patterns of performance for quality planning and generating cost opens that damage their own image and attractiveness potentially linked to the use of their comparative advantages. Also the practice of action in this field is resentful when trivialize or ignore blocks of techniques applied to the evaluation of territorial public policy or when the necessary prospective vision is relegated to the background or just does not come to arise, precisely because of the tendency to emphasize the immediate project plan conceived against a broader horizon. They are revealing aspects of this as usual to favor short-term vision of the proceedings against the relevance sufficiently highlighted by the warnings repeatedly speaks for itself, the focus on the medium and long term, integral to the principles of precaution and prevention contributing trend support the idea of sustainability.





# HABITAT MODELING FOR LOCAL ABUNDANCE ESTIMATING. THE RED PARTRIDGE IN AN AGROSYSTEM IN TOLEDO (CENTRAL SPAIN)

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## I. INTRODUCTION AND OBJETIVES

Local management as hunting, agriculture or rural development need a good knowledge of the ecosystem to guarantee wildlife conservation. Nevertheless, most of the times there are not enough time or resources to do the studies with the required effort. Specifically the fauna populations monitoring is an essential task in any management program (Belda *et al.* 2011), but in general the monitoring works are scarce detailed. Accordingly, the habitat modeling methods are a useful tool to predict fauna distribution or abundance with a scarce sampling data (Guisan & Zimmermann 2000 y Nielsen *et al.* 2005).

Usually habitat models are used to predict the distribution of rare or threatened species, or to predict the potential dispersion of invasive species (Engler *et al.* 2004), when populations or suitable habitats are small. In the same way, these models are usually used to predict species distributions for regional or continental scales using topographic and climatic variables (Araújo & Louto 2007). Nonetheless, there are only few studies about huge range species and about predictions at local scales. Hunting management is a particular example of local management where is necessary an exhaustive monitoring programs of fauna populations, and where the use of this kind of modeling methods can be useful.

In this context, the aims of this study are to determine if the habitat modelling at local scale is useful to estimate fauna abundance, to find out the contribution that have been the land use changes to the *Alectoris rufa* populations, and to deepen the ecological requirements of *Alectoris rufa* in the study area.

## II. SPECIES AND STUDY AREA

As study case we selected the space surrounded by the hunting preserve of Valmojado village (Toledo). It is located in the NW of Toledo province, and its total surface is 6.758 hectares. The geomorphology is undulating with slight slopes, the altitudes vary between 550

and 680 m.a.s.l., and the climate is homogeneous in the whole territory. The landscape is a good representation of the traditional Spanish agriculture landscape, with a mosaic structure of vineyard, cereal crops, small olive groves, and small Mediterranean scrubland plots. However, during last years the farming lands have been abandoned and scrublands surface has been increased, so the mosaic structure is changing.

In the study area the most important hunting species is *Alectoris rufa* (red partridge), and moreover it is a central species of the Mediterranean food chain (Blanco Aguiar *et al.* 2004). *Alectoris rufa* live preferably in agricultural areas (Fortuna 2002), and the mosaic structure landscape is the most important factor in the habitat selection of *Alectoris rufa* (Blanco Aguiar *et al.* 2004). Consequently their populations are highly affected with the land occupancy changes, and that is the reason why the main threats of *Alectoris rufa* are the intensification or abandonment of agricultural activity (Blanco Aguiar *et al.* 2004). The study area has one of the most *Alectoris rufa* density of Spain, even so, the *Alectoris rufa* populations dropped in general during last decades in whole Spain (Blanco Aguiar *et al.* 2004).

### III. METHODS

To sample *Alectoris rufa* presence we used 11 transects which total length was 37 km. In each transect we recorded all *Alectoris rufa* sighted in a buffer of 100 meters in both sides, and for each contact we noted the UTM coordinates and the distance to the track. Then, to model the suitable habitat we selected three types of variables: topographic, land use, and various landscape structure indices. The landscape structure indices were created with the software Fragstats® (McGarigal *et al.* 2002) and Esri® Arcmap™ 10.0, and there were created for the year 2009 and for the year 2000. Before we detected the land use changes between 2000 and 2009 using the land registry parcel and aerial photographs to classify the land uses. In total we used 11 variables for each year to model the habitat: 8 landscape structure indices, 2 topographic variables (slope and geomorphology), and the land use. After that, to calculate the suitable habitat we chose an only presence model because we consider that the use and the results interpretations of these methods are simpler than other methods, and the precision and reliability are enough for local management tasks. In particular, we used the Maxent model (Phillips *et al.* 2006), because many comparative studies support that Maxent interpretations are better and simpler than other methods (Sérgio *et al.* 2007, Benito de Pando & Peñas de Giles 2007), and because it is a method rather stable using correlated variables (Elith *et al.* 2011). The *Alectoris rufa* suitability habitat model was created with the actual data, and then the model was projected 10 years ago. Afterward, the abundance of *Alectoris rufa* was calculated with the software Distance 6.0 Release 2 (Thomas *et al.* 2010) by two methods: firstly considering only one stratum, and secondly using two strata that have been obtained from the classification of the suitability habitat model.

### IV. RESULTS

The ecology explanation of the habitat model made supports other results obtained in previous studies about *Alectoris rufa* (Herranz *et al.* 2000; Fortuna 2002; Buenestado *et al.*

2008). In this regard, the ecological requirements that we deduced agree on a positive selection of fragmented farm areas with a high patches density. Inside this structure, we observed a light preference to vineyard patches, and a refusal to pastures. Furthermore, we observed that *Alectoris rufa* select bottom valleys against hills or slopes.

In the other side, the abundance estimating that we obtained using two stratum give lower variation coefficients than using only one stratum, so we can support that abundance estimating accuracy for *Alectoris rufa* was better using the habitat suitability model to create stratum for the estimation. Moreover, this methodology make possible to do projections and predict the potential effects over the abundance variability caused by an ecosystem transformation. Consequently this methodology can be a useful tool for management tasks.

The model projection to year 2000 shows a decrease of the high suitability area surface for *Alectoris rufa*, which would has caused its abundance decrease. We deduce that this abundance decrease is because of the variations produced on the land use during 2000 and 2010, as is just the only variation that we took into account between the two models. Those land use variations observed are mainly consequence of the agriculture abandonment, which affects to the 20 % of the total study area. And this massive abandonment reduces the number of patches and the ecosystem fragmentation, which original mosaic structure compose the best suitable habitat for *Alectoris rufa*.

## V. DISCUSSION AND CONCLUSIONS

Some authors agree that the agriculture intensification is the main reason of the general decrease of *Alectoris rufa* populations (Fortuna 2002 y Vargas 2002). However, in this study we assert that another factor -the agricultural abandonment- is the cause of drop populations of *Alectoris rufa*. These contradictory causes point out that the essential to hold the red partridge abundance is to preserve the traditional agricultural landscape, keeping a variety mosaic of crops and vineyard with some scrubland patches mixed (Jiménez-García *et al.* 2006, Buenestado *et al.* 2008 y Belda *et al.* 2011).

Finally, we assert that to preserve the *Alectoris rufa* populations and their associated species is necessary to assume appropriate management tasks that favour the maintenance of traditional farming conditions, which guarantee the mosaic landscape structure.

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# THE APPROPRIATION OF REAL ESTATE INCOME IN SPANISH NEOLIBERAL CITIES

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The Spanish neoliberal agenda has been specifically linked to specialization in what is known as the secondary circuit of capital (Harvey, 1982; Lopez and Rodriguez, 2010). This has involved a gradual reduction in landowners' importance and hegemony and a parallel rise in the importance of developers and financial institutions in matters concerning the appropriation of real estate income.

This paper aims to address this issue, looking at the case of Spain, through an analysis of two parallel processes: first, the evolution of urban planning legislation approved since the 1990s and, secondly, the evolution of mortgage legislation. In combination, both mechanisms have led to the financialization of land and its integration into global circuits of capital through mortgage securitization, determining the emergence of a system of capital accumulation based on urban real estate which typifies the current crisis (Harvey, 2012: 51-106).

## I. THE NEOLIBERALIZATION OF SPANISH URBAN PLANNING LEGISLATION

In Spanish urban planning, owners of land classified in municipal plans have traditionally been recognized as having a preferential right to capitalize urban development gains in exchange for certain obligations (the surrender of certain land for public infrastructure or utilities, payment of the cost of this development work, construction within a certain time period, and the surrender of 10% of the used land as from 1975).

This system is highly singular (García-Bellido, 1999) since, in other countries, municipal plans do not grant such strictly guaranteed rights to owners even though the end result of the process might be similar. As noted, this model perpetuated the basic precepts of the 1956 Franco Act in its capacity as «the radical perversion of the construction sector's traditional endemism (...) [since] the easy money that this system engenders is all too tempting» (García -Bellido, 2004: 294).

## II. THE NEOLIBERAL EVOLUTION OF SPAIN'S SINGULAR URBAN PLANNING SYSTEM

In the 1990s, the entrepreneurial sector championed a change in urban planning through a shift toward liberalization, based on two strategies that lead to different scenarios: an

aggregate or single-headed model versus a disaggregated or two-headed one (García-Bellido, 1989: 210-221). The first was politically conservative in thinking and the second liberal.

From a doctrinal point of view, in 1993 when an important liberalizing financial law had already been passed, two studies for the liberalization of the land market emerged, based on different strategies. The first was a report by the Tribunal de Defensa de la Competencia (Competition Commission), which encouraged liberalization through aggregate single-headed approach.

The second important doctrinal contribution to the proposed liberalization of the land market was the publication of an article by Javier García-Bellido entitled «The effective liberalization of the land market. Breaking away from the right to real estate ownership in an advanced society» (García-Bellido, 1993), which clearly distinguishes between authority to use and dispose of land and authority over things of urban public interest. The aim was to prevent private owners from curbing private initiatives.

The first major innovation directed at doing away with owners' quiritary monopoly was *Act 6/1994, of November 15th of the Valencia Regional Government, regulating urban development activity*. The novelty of this act and other regional laws that followed it was that it replaced former landowners with new real estate owners/developers, boosted by the process of development of today's new cities and, consequently, by the appropriation of the capital gains generated by this process.

A conservative aggregate urban property model was consecrated in 1998 with the approval of *Spanish Act 6/1998 on the land regime and valuation system*. This law establishes that all unprotected land can be developed and that the value of the land shall be the equivalent of the anticipated business profits of virtual activities yet to be carried out» (Fernández, 2011: 80). That is to say, all land that is not explicitly protected can be developed and the value attributable to its owners is recognized as being the aggregate single-headed urban property value.

Neither approach has achieved the goal of controlling the price of housing to make it accessible to most of the population, because lowering the price of land for developers by not forcing them to pay the expected speculative value that owners used to demand has merely resulted in this expected speculative value being passed on in its entirety to the developer. As a result, this has not led to a drop in housing prices.

Given the evidence of both strategies' vain attempt to bring down the price of housing, the cause of its constant rise should be sought by looking at other factors that transcend pure urban planning policies. This is where financial policies enter into play.

### III. THE FINANCIALIZATION OF LAND AND ITS INTEGRATION INTO GLOBAL CIRCUITS OF CAPITAL: THE EVOLUTION OF SPANISH MORTGAGE LEGISLATION

As had already occurred with the 1970s Fordist crisis (Harvey, 2005), ways of appropriating real estate income began to change as a result of the shift in the Fordist production system itself; a shift encouraged by the gradual emergence of neoliberal policies and financialization.

With land transformed into a financial asset that is bought and sold, it is no longer land in itself, but the expected fictitious right to any presumed potential income from its urban development (Harvey, 1982). This is accomplished through the purchase and sale of

real estate and financial securities: mortgage securitization, which aims «to avoid the risk of defaults on payment, in addition to increasing the scale on which mortgage loans are generated» (López and Rodríguez, 2010: 291-2). In Spain this occurred with *Spanish Act 19/1992 of July 7th on the system governing real estate investment companies and funds and mortgage securitisation funds*.

With this act, mortgages — conveniently packaged into products of varying qualities — were launched onto the securities market (Jiménez and Sánchez, 2002). In this way, the Spanish mortgage market joined international financial circuits, significantly increasing its growth potential and its risk; a very important change in the role of credit in the consumer society (López and Rodríguez, 2010). With this new formula «credit was no longer optional» (López and Rodríguez, 2010: 285) but an essential factor in consumerism. In fact, with the drop in the growth of wages, credit became the main gateway to consumption.

With an increasingly broad flexible mortgage market, credit institutions gradually devoted a larger part of the loans they granted to financing housing or to property development. As a result, there was a shift in urban planning legislation toward the neoliberal approaches outlined above.

In 2007, *Spanish Act 41/2007 of December 7th* was passed, amending *Spanish Act 2/1981 of March 25th on the regulation of the mortgage market and other rules governing the mortgage and financial system and on the regulation of reverse mortgages and long-term care insurance for which a certain tax regulation is established*. Its preamble recognizes that housing finance represents «about two thirds of the value of the total wealth of the state's households, while this funding also depends on the mortgage market». At the same time it was also acknowledged as being one of the «segments of the financial system with the greatest influence on macroeconomic and financial stability». That is, thanks to the loans granted by financial institutions, two thirds of households' wealth was comprised of debts and the economy's financial stability was based on this debt.

In 2008, *Spanish Royal Decree Law 2/2008 of April 21st on measures to boost economic activity* allowed the maximum limit for the granting of state guarantees on asset securities to be raised to 3,000 million euros. With this measure, this type of asset was even further promoted, an objective acknowledged in the preamble to the royal decree approved by the now Socialist government.

Neither did the 2007 crisis manage to halt the increase in securitization-based products, which have continued to monopolize the banking sector's financial activities. Given this financial storm, it has been hard for urban planning policies to resist the shift toward neoliberalism, with all unprotected land becoming potentially developable at the initiative of its owners or else it becoming possible to develop land rated as apt for development, regardless of the land's owners. Loaned money (albeit fictitious) flooded the land market, and urban planning policies merely attempted to channel this flood, either with plans that defended owner interests or with ones that defended those of developers.

#### **IV. CONCLUSIONS**

Classic capitalist mechanisms for appropriating real estate income in Spain have been radically transformed.



More attention has been paid by urban planning academics to changes in the traditional Spanish urban planning system than to events in the financial system. However, if an analysis is made of the chronology of both types of legislation, it can be clearly observed that what came first were financial liberalization reforms, leading directly to a new neoliberal approach to Spanish urban planning. The neoliberal regulation of the mortgage system came into being with the approval of a law in 1981 and securitization was given the green light in 1992; one year prior to the first studies and reports in favour of different forms of liberalizing urban planning and two years before the approval of the first liberalizing planning act, the LRAU, in one of Spain's 17 self-governing regions. Thus, it has been 1980s and 1990s neoliberal economic and financial ideas that have dragged urban planning policies along the road of neoliberalism.

The adaptation of mechanisms for producing/appropriating real estate income in Spain to the new neoliberal system of capital accumulation has been carried out in two different albeit complementary fields, finance and urban planning. In the first case, financial activities have been liberalized through the introduction of new mechanisms, such as securitization, which resulted in mortgage flows surpassing the possibilities of the real or productive economy. In the second case, urban planning was deregulated in two non-opposing ways: allowing for the development of all non-protected areas and opening the gateway to the enforced sale of land to tender-winning developers.

As a result of financial and urban planning changes in Spain, the role of stakeholders in the production and appropriation of income from urban development has led to a change in trading relations, from the initial owners of land to financial institutions.

With the Fordist model, because owners sold their land as a matter of choice, they were in a position to demand part of the urban development income generated as a result of the creation of urban areas. This meant that they could potentially obtain a higher percentage of this income or, at the very least, a way of obtaining it without the risk of actually developing the land. Meanwhile, developers sought the services of local financial institutions with a lending capacity directly conditioned by the amount of money deposited by their customers, who were mainly locally based.

The neoliberal model incorporates two important new factors in comparison with its Fordist predecessor in the fields of urban planning and finance. On the one hand, the relationship between owners and developers is no longer based on sales made through choice but on compulsory sales, where prices are proposed by tender-winning developers. At the same time, mortgages previously taken out by developers or private individuals are securitized, directly linking the system with worldwide financial markets, thus providing the funding that regional financial institutions were unable to provide.

In this sense, the Fordist dispute over real estate income between owners and developers is becoming a thing of the past. It is no longer possible to talk about a social class of urban property owners but instead we must talk about power groups or oligarchic urban development lobbies. With this change, some business groups have become dominant stakeholders in the current process of the production/appropriation of real estate incomes. This also means that those who control the property market come to play an active role in creating the conditions that allow them to boost their future income through policies aimed at reclassifying and revaluing urban land. It is not so important whether land is in the hands of owners or developers. What really matters is who owns the mortgage behind the development process or purchase of housing.