A Territory-Oriented Approach to Operationilize Sustainable Management

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A Territory-Oriented Approach to Operationilize Sustainable Management

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Abstract- Sustainable science ultimately seeks to minimize the negative impact of human activities on nature, however its role is regarded as limited, chiefly because it lacks a robust spatial framework to join ecological and social processes. Space, from a territorial perspective, is the result of historical interactions between socio-economic forces governing access to natural resources. This paper provides a territory-oriented approach to improve land use policy from a spatially explicit perspective. We develop a novel approach, namely 'Territorial Configuration' implying the dissection of the geographic continuum into territorial conglomerates. These are delimited by a range of meaningfully socio-historical liason encompassing a clear understanding of how space is controlled by space holders triging proximal and underlying governing processes. We discuss how the territorial configuration facilitates overcoming pending issues in land use policy, such as ecological and geographical articulation, legitimate decision-making process, and increase of certainty on the subject of management among others.

Highlights: The geographic continuum dissected by territories gives meaningfully socio-historical basis.

The territorial configuration approach bridges holistically social and ecological approaches.

The territory-oriented approach helps moving forward to sound land use policy.

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I. Introduction

Environmental Management (EM) emerged in the 1990s in the light of current man-made pressures on the natural system. It focuses on documenting the relationship between natural resources and human activities and assessing derived proximal and underlying effects on the environment, eventually minimizing the negative impact of human activities. In the last decade, EM has evolved as part of the emerging fields known as Sustainability Science and Transdisciplinary Research. These fields focus on coupled human-environmental systems, science-society links and knowledge systems (Komiyama and Takeuchi 2006; Miller et al. 2014). It is therefore expected that EM be reframed in order to fulfill the needs of Sustainability Science and Trans-disciplinary Research (Lang et al. 2012). This reframing is critical to gaining insight from previous experiences and eventually in over coming failures. It is undeniable that EM has had a positive impact on a number of topics, namely, biodiversity and forest management and environmental services, among others. Even so, EM has revealed barriers and difficulties when applied to real problems, and its role in sustainable science has been regarded as limited (Conacher 2003; Barrow 2006; Fisher et al. 2012). Coordination and collaboration between stakeholders and institutions have been pinpointed as major weaknesses in terms of achieving effective EM (Margerum and Whitall 2004; Margerum2008; Gregory et al. 2012; Eshrag et al. 2015). The goal of recreating EM as an operational framework and eventually as a bridge to other complementary approaches such as resilience, vulnerability and adaptation (Brand and Jax 2007), confronts a number of challenges: first, a dissected rather than a unified perception of natural resources (soils, water, forests and biodiversity, among others) which occur interacting interdependently at all times in all places (Fish 2011); second, integrative analysis of past, present and future socio-economic underlying driving forces (Ostrom 2008); third, a robust geographic framework to holistically approach the former and latter challenges (Turner et al. 2003); and fourth, recognized mismatches among stakeholders or agencies across multi-level state and non-state governance, involving issues of legitimacy and equity (Margerum 2008; Moss and Newig 2010;Mikulcak et al. 2013). These last two challenges were clearly identified as cornerstones in most ecological studies, and they have remained insufficiently amended.

Space in ecological studies has been approached by dissecting the geographic continuum into vector or raster (pixels) formats (Geoghegan et al. 1998). Other approaches based upon biophysical categories, such as regions, watersheds or aquifers have been used as surrogates for geographic framework (Wu 2006). Neither pixels nor biophysical categories provide a comprehensive understanding of the underlying aspects such as social and governing forces (Liverman et al. 1998). We argue that geographic framework is far more than pure geometric spatial dissection or temporal and functional links and fluxes. Space, from a geographical framework viewpoint, is the result of historical interactions between socio-economic forces governing access to natural resources. Furthermore, space is affected by the presence of

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intertwined feelings connecting people with places by establishing limits through political, economic and cultural processes (Santos 2001; Claval 2002). The aim of depicting the geographic continuum is ultimately to establish boundaries. Boundaries are flexible, fuzzy, porous and dynamic. These boundaries, rather than being limited uniquely by biophysical attributes, are depicted by short and long-term social processes from which territories were then derived. In turn, place-based social processes interaction results in a tied liaison between place and the holder who seeks to control access to all resources (Raffestin and Butler 2012).

Territory deals with space engagement, rules of control and power relationships and ultimately represents the arena for grounded decision-making processes. Territories, however, can also be the following: fuzzy, non-homogeneous, non-consistent and non-contiguous, with disconnected nodes across linking spaces. To our knowledge, EM formulation and practice has remained 'de-territorialized' and little research has been done to provide a territory-oriented approach to link spatially explicit functional relationships between natural resources and socio-economic driving forces.

The aim of this paper is to provide a territory-oriented approach to improve operationalization of Environmental Management from a spatially explicit functional perspective. Specifically, we revisit the roots of the concept of "Territory", hence developing a semantic map to introduce a novel approach, namely "Territorial Configuration". Furthermore, the territorial configuration approach is discussed as a complementary pathway to turn the concept of socio-ecological systems into effective management actions by providing sustainable science with a robust geographic framework.

II. Environmental Management Framework

Environmental Management (EM) is generally understood as the processes of decision making, planning, administration, implementation and evaluation of human activities--purely driven by social actors such as individuals, community or institutional aggregations--directed toward transforming nature into resources (Barrow 2006). Ideally, EM aims to maximize positive internalities (maximum profit) represented by social groups (stakeholders) and natural resources (object of management) and to minimize negative externalities (minimum environmental costs). The theoretical roots originally established by Patten (1978) refer to "Environmental" as fluxes affecting a system, explicitly related to causes and effects impacting upon the original system state. EM has now come to encompass natural capital conservation, watershed management, payment of ecosystem services and environmental policy programs, among many other issues of sustainable science (Barrow 2006). EM has evolved towards adaptive management and participatory approaches (Kapoor 2001), such that transdisciplinary platforms are strongly recommended (Brand and Karvonen 2007). EM (sensu Margerum 1999) comprises two significantly different connotations, namely, programs geared toward regulating access to resources (so-called "administration" in English, whereas "gestion" and "gestión" in French and Spanish, respectively) and man-made actions to transform nature (ecosystems) into resources (so-called "management" in English and French or "manejo" in Spanish). Because of the two above-mentioned management connotations, two types of flows are identified: top-down and bottom-up. The former is more related to policies, whereas the latter is oriented toward nature transformation.

Lately, social and ecological sciences have been complemented and intermingled with the aim of increasing effectiveness in EM (Young et al. 2006; Díaz et al. 2011). Ecological literature often reports inconsistent spatial concepts, such as bioregions, ecozones, ecodistricts, biophysical units, ecoregions and ecosystems to denote geographic framework (e.g. Margerum 1999; Barrow 2006). Other efforts refer to "Territory" as administrative units (Loiseau et al. 2012) or arbitrary regions such as the Iberian Peninsula (Quintana et al. 2010). Upon thorough review, it became evident that EM has largely neglected the concept of territory. Two well-documented environmental management topics may serve to illustrate the previous statement, namely biodiversity conservation and watershed management.

The establishment of protected areas? has recently emerged as the main environmental policy instrument targeted at preserving ecosystem integrity and biodiversity conservation, as a response to the unprecedented rate of species extinction (Pimm and Raven 2000). Conservation of hot spots and effective management of protected areas have become critical from the global viewpoint. The development of this environmental management policy was clearly illustrated by Naughton et al. (2005), who documented the exponential increase in the number of parks established and the area under protection (in the 1960s there were around 1,000 protected areas, and today there are over 100,000, covering about 20 millionKm^2). The effectiveness of protected areas worldwide, in spite of their clear spatial delimitation (Terborgh 2002), has been largely controversial (Bruner et al. 2001; Rodriguez et al. 2004; Vallino 2014). Design, operation, law enforcement and disengagement of local stakeholders are just a few of the main issues yet to become uniformly effective within protected areas (Cumming et al. 2015). "Making parks work", as literally stated by Terborgh (2002), became critical when studies showed that mega diverse regions harboring most global biodiversity hot spots were the ones most ineffective (Brechin et al. 2003;

Figueroa and Sanchez-Cordero 2008). In most cases, ineffectiveness has been related to the lack of enrolment of key stakeholders with legal and legitimate jurisdiction and scope for decision making with whom negotiation may take place with the aim of eventually engaging them as core allies (Kaimowitz and Sheil 2007; Velazquez et al. 2009) rather than as the major threat (Terborgh 2002; Redford et al. 2008).

The Watershed Management approach was initially a technical tool defined by hydrological processes with tangible spatial boundaries, and it has recently transformed into a policy framework where watersheds are no longer regarded as biophysical polygons, but rather as governance units (Molle 2009; Cohen and Davidson 2011). It is undeniable, nonetheless, that current progress in conceptual and technical capabilities in watershed management are significant. Uncertainty on the governance issue, however, has emerged as the core challenge. Currently, the most outstanding topics in watershed management are articulation of public policies via coordination across sectorial government agencies (Molle 2009), collaboration and partnerships with non-governments take holders (Margerum and Whitall 2004; Huitema et al. 2009; Benson et al. 2013) and decision-making support systems (Muste et al. 2013). These topics are regarded as stepping stones for promoting watershed governance networks (Castro 2007; Moss and Newig 2010) as well as social learning processes (Pahl-Wostl 2009). The former and the latter are essential underlying conditions for envisaging adaptive capacities and facing uncertainty in water resources and societies that depend on them.

The negligence of a territory-oriented approach in biodiversity conservation and watershed management is even more conspicuous within specific study cases, such as the one in Mexico.

a) *Overview of biodiversity conservation and watershed management in Mexico.*

Mexico, indisputably regarded as a mega diverse country (Sarukhan et al. 2015), adopted the biodiversity conservation initiative by establishing protected areas. In the 1940s, Mexico set up 39 covering an area of 0.62% of the national territory, whereas, today, it has established 177, covering 13.04% of the country's area (www.CONANP.gob.mx). The effectiveness of Mexican protected areas is controversial too. A limited number of protected areas have been somewhat effective in some regions such as the Baja California Peninsula (Rosete et al. 2014), whereas other regions, such as the states of Chiapas, Oaxaca, Guerrero and Michoacan, have been rather ineffective (Figueroa and Sanchez-Cordero 2008). A top-down authoritarian commissioner governs Mexican protected areas, each operated by a director. An advisory committee board (scholars, park administrators and policy makers) supports to a greater or lesser degree

from area to area the commissioner-director´s decisions. Regional and local stakeholders are mostly overlooked when management policies are designed, and, eventually, these are dictated with the expectation that all concerned will govern themselves accordingly. It has been documented that most outstanding Mexican biodiversity hot spots are not socially empty spaces (Bray and Velázquez 2009; Sarukhan et al. 2015). Under these circumstances, novel territorial conservation strategies based upon genuine engagement of regional and local stake (right) holders with whom agreements and need-based negotiation strategies can be designed, have proved more promising. Protected areas should, therefore, not be primarily targeted at preserving the integrity of pristine functional ecosystem processes or biodiversity sinks, but rather regarded as strategies to reduce inequality and poverty, acting as vehicles of empowerment (Velazquez et al. 2009). As a result, natural resources are regarded by local communities as their natural heritage and therefore fiercely conserved and defended (Brechin et al. 2003; Bray and Velazquez 2009; Herner 2010).

Watershed Management in Mexico started in 1992 under the umbrella of the National Water Law known in Mexico as the "Ley de Aguas Nacionales" (Ortiz-Rendón 1993). Consequently, national territory (1,973,000 km^2) was split into 13 administrative hydrological regions. This environmental policy raised expectations as to sound management for contrasting regions -- either by managing hydrological excesses (recurrent floods) or deficits (recurrent droughts) or by providing watershed management as an opportunity for regional development. In turn, basin councils for decision-making were progressively installed, reaching 26 by 2015 (www.CONAGUA.gob.mx). In practice, the National Water Commission, known as the "Comisión Nacional del Agua" enforced a top-down vision in the composition of decision-making structures. Outcomes so far have shown that the capacity of basin councils for institutional coordination and the opportunity for stakeholder collaboration have not fulfilled needs and expectations (e.g. Moreno 2015). These failures remain in spite of manifested political will for tackling national watershed problems (e.g. CONAGUA 2011).

III. Territory Framework

a) *Conceptual Overview*

The concept of territory emerged from the domain of human-political geography (Delaney 2005); and, according to Elden (2010a), it has been used as a surrogate for land, plot, area and landscape, or as a noun to refer to a specific jurisdiction (municipality, state, nation, country). According to Santos (2001), "Territory" is the result of historical interactions between socio-economic forces governing access to natural resources by establishing limits through political,

economic and cultural processes. In consequence, a "Territory" is under continuous construction and derived by compartmenting the geographical continuum. Owing to the complex socio-economic processes involved in constructing territories, the concept is clearly multipurpose (Paasi 2003a). The concept of Territory is core within the domain of geographical sciences and indisputably comprises polysemic interpretations. In general terms, it refers to the process of engagement or appropriation of a given space by subjects (stakeholders). The concept of territory now refers to an orderly humanized place where nature and culture are melded together through the influence of social institutions in charge of creating and implementing rules targeted at pursuing stakeholders' actions (Raffestin and Butler 2012). Territory is, therefore, a state of power depicting habits, traditions and access to the most critical resource, "the space". To claim there is a Territory, recognizable tangible boundaries, functional or symbolically established borders, rules and levels of governance to enforce them must be present (Elden 2010b; Herner 2010). In this way, engagement or appropriation harbors tangible, functional and cultural territories and denotes a geographic continuum etched by the history of occupation and social meanings (Fig. 1).
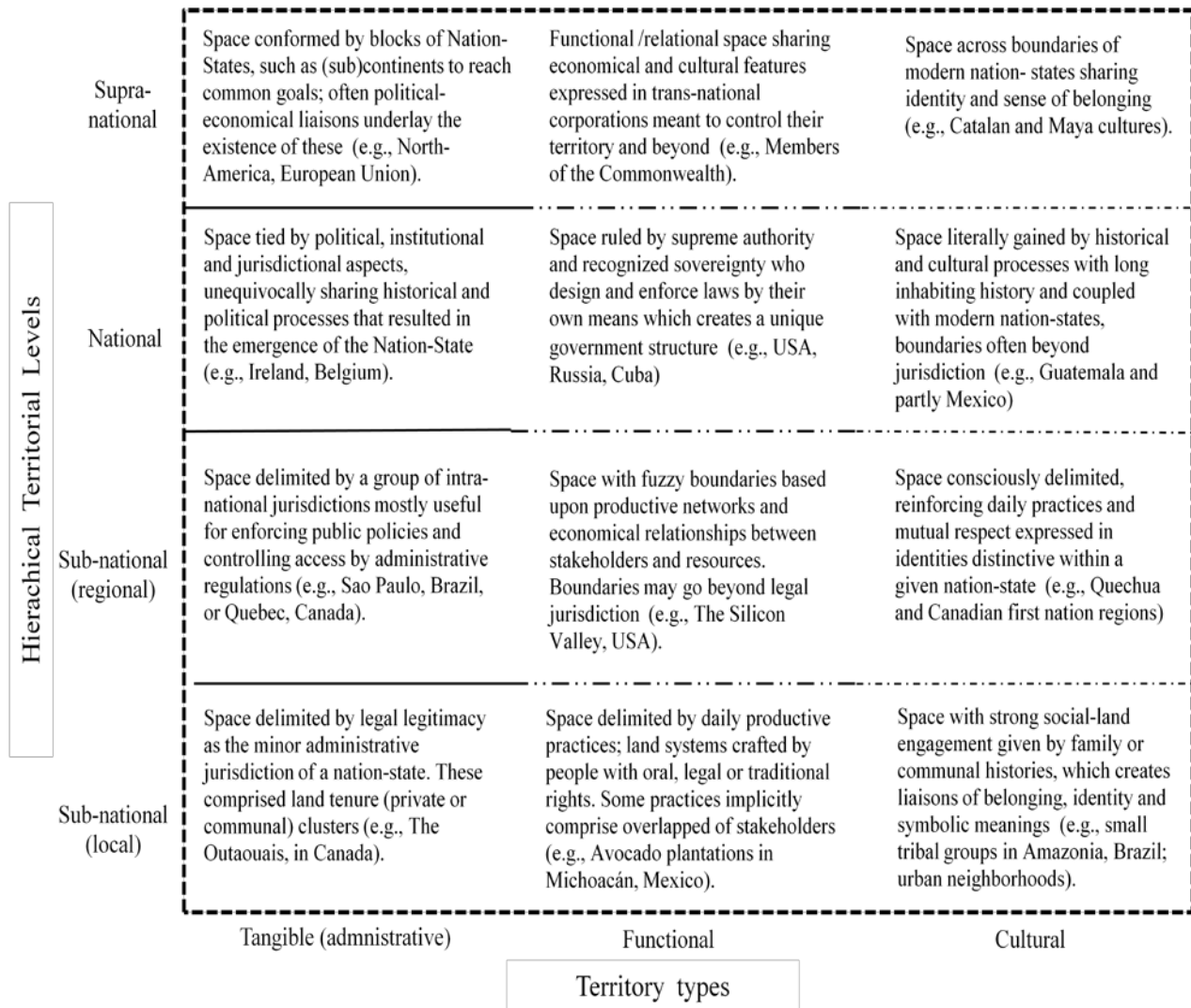
Hierarchical Territorial Levels	Tangible (administrative)	Functional	Cultural
Supra-national	Space conformed by blocks of Nation-States, such as (sub)continents to reach common goals; often political-economical liaisons underlay the existence of these (e.g., North-America, European Union).	Functional /relational space sharing economical and cultural features expressed in trans-national corporations meant to control their territory and beyond (e.g., Members of the Commonwealth).	Space across boundaries of modern nation- states sharing identity and sense of belonging (e.g., Catalan and Maya cultures).
National	Space tied by political, institutional and jurisdictional aspects, unequivocally sharing historical and political processes that resulted in the emergence of the Nation-State (e.g., Ireland, Belgium).	Space ruled by supreme authority and recognized sovereignty who design and enforce laws by their own means which creates a unique government structure (e.g., USA, Russia, Cuba)	Space literally gained by historical and cultural processes with long inhabiting history and coupled with modern nation-states, boundaries often beyond jurisdiction (e.g., Guatemala and partly Mexico)
Sub-national (regional)	Space delimited by a group of intra-national jurisdictions mostly useful for enforcing public policies and controlling access by administrative regulations (e.g., Sao Paulo, Brazil, or Quebec, Canada).	Space with fuzzy boundaries based upon productive networks and economical relationships between stakeholders and resources. Boundaries may go beyond legal jurisdiction (e.g., The Silicon Valley, USA).	Space consciously delimited, reinforcing daily practices and mutual respect expressed in identities distinctive within a given nation-state (e.g., Quechua and Canadian first nation regions)
Sub-national (local)	Space delimited by legal legitimacy as the minor administrative jurisdiction of a nation-state. These comprised land tenure (private or communal) clusters (e.g., The Outaouais, in Canada).	Space delimited by daily productive practices; land systems crafted by people with oral, legal or traditional rights. Some practices implicitly comprise overlapped of stakeholders (e.g., Avocado plantations in Michoacán, Mexico).	Space with strong social-land engagement given by family or communal histories, which creates liaisons of belonging, identity and symbolic meanings (e.g., small tribal groups in Amazonia, Brazil; urban neighborhoods).

Territory types

Figure 1: Semantic map describing types and hierarchical levels of territories. These all are spatial entities delineated by boundaries stating degrees of power and jurisdiction by space holders as defined in this contribution.

b) *Territory Types*

Tangible (administrative) territory types are spatial expressions delimited by the control of a subject, group or institution with clearly established authority (Fig. 1). The subject ruling tangible territories enforces economic control by controlling use of space and limiting access to natural resources. Tangible (administrative) territories are constructed by pondering, based upon a relative value, the geographic continuum into a recognized spatial arrangement, seeking at compromising externalities among stakeholders and allowing the possibility of being mapped (Newman 2003). These territories are clearly illustrated by spatial entities with specific jurisdiction such as municipalities,

an established national park or physical boundaries, such as a given watershed, where it is desired to implement a given policy. Tangible (administrative) territories are delimited by clear boundaries, often supported by laws. Sovereignty is therefore crucial and the construction of these territories and its permanence ranges from decades to centuries.

Functional territory types refer to spatial entities with changeable limits characterized by high internal cohesion resulting from practical socio-economic processes derived from natural resource-stakeholder relationships occurring within those given spatial entities (Amin 2004).There are two main types of functional territories: those resulting from long-term endogenous process such as traditional productive systems (e.g., The Chakra [Hammen 1992] and The Chinampa [Parsons 1976]) and those largely driven by exogenous issues, such as global markets, international agreements, and product prices, among others. To illustrate further, consider that a given spatial entity is devoted to soy production. This spatial entity may change drastically if the price of the product drops markedly as a result of global markets. In turn, the former functional territory will adapt to a new situation and, in consequence, the geographic continuum will be re-configured (Peyrony and Denert 2012). Sun-grown coffee, sugar cane, livestock production and mining are clearly other typical examples (Garces-Feliu et al. 2010). Functional territories are delimited by a mosaic of fuzzy boundaries and their permanence ranges from years to decades.

Cultural territory types arise when individual human beings, usually clustered in communities, establish certain engagements or an identity with their spatial entity through symbolic representations. This representation emerges from the inhabited history of the place resulting in cultural milestones (traditions), which indisputably create a unique connection between individuals clustered in communities and their environment. Traditions are built and internalized via socio-cognitive constructions, which govern daily life decisions (Herner 2010). Generally, endogenous issues drive cultural territories. Examples comprise geographic entities sharing food habits, a given language or a specific belief. The geographic continuum split by cultural territories is often intermingled, since symbolic representations may not be shared homogeneously by all members of a given community and, in consequence, they are not universally valid (Newman 1999). Within a given spatial entity, for instance, a community may comprise individuals of the same ethnic group speaking a unique language; said individuals may, nevertheless, not share the same religious beliefs. These symbolic representations, however, comprise the most critical aspects of belonging and identity and therefore the essence of most human beings. Cultural territories are delimited by a degree of fuzzy boundaries

and their permanence ranges from centuries to millennia.

c) *Hierarchical Territorial Levels*

Hierarchical organization is an important issue in EM, and it has, for decades, been regarded as a cornerstone of sustainable and ecological sciences (Kareiva and Wennergren 1995) as well as of social sciences (Lamont and Molnár 2002). Within the domain of geography, hierarchical territorial levels are the following: local (community-municipality), regional (state-subnational), national and supranational (Fig. 1). Scientific focus on a specific hierarchical level has changed, such that, in the nineteen century, much attention was given to the local and regional; in the twenty century, attention moved towards the national; for the last 30 years, planetary environmental and socio-economic issues have rekindled interest in territorial expressions at the supranational level (Tuathail and Luke 1994). Hierarchical territorial levels are here described in order of jurisdiction, with national first, followed by regional, local and, last but not least, supranational.

The national territorial level is primarily depicted by political and institutional processes and represents the roots of most nation-states (Antonsich 2010). At a certain point, communities, in spite of their likely cultural differences, gain identity. The notion of a nation hence emerges as a cultural identity of groups, which have historically occupied certain defined spaces. The State governs by means of enforcing laws, which establish control and vigilance over clearly defined spatial limits. These limits designate territorial division where the State exercises sovereignty through legal jurisdictions (Berg and Kuusk 2010). National territories are delimited by indisputably tangible boundaries, and exogenous and endogenous forces rule, such that the exogenous play a key role in the recognition of sovereignty, whereas endogenous forces do so in the exercise of jurisdiction. At this level, urban-rural centers share the ruling role, although this depends on the level of development. It is still mostly centralized governments that take dictatorial decisions.

The regional territorial level (provinces or clusters thereof) is the result of a top-down administrative vision of a nation-state, clearly tangible in their boundaries and aimed at enforcing laws, policies, programs and projects (Baletti 2012). Territories at this level bring to mind the concept of territory as a demographic container (Taylor 1994) or political instrument where the State governs by attending to the local population's needs (Baletti 2012). In these territories, functional issues prevail (Allen and Cochrane 2007), whereas symbolic ones are hardly relevant. To illustrate this, Paasi (2003) differentiated between "identity of a region" and "regional identity". The former aims to enforce a political manipulation of the

population or market-oriented objectives. The latter is built from the consciousness and feelings of belonging of individuals as a result of a lengthy common history (Jonas 2012). Regional territories are defined by tangible boundaries. If a nation is highly developed, decisions prevail in urban areas; whereas decisions dominated by rural areas prevail if a nation is still developing.

The local territorial (municipal-communal or clusters thereof) level is constructed by a lengthy history of occupation (several generations), where daily life traditional practices have prevailed. At this level, every spatial entity is used, perceived, conceived and lived in by specific stake(right)holders in whom belonging, identity and action converge (Governa and Salone 2004). Definitions of roles are fuzzy, since, for some practices, a stakeholder forms part of one cluster (e.g., livestock producers), yet the same stakeholder may be part of another cluster occupied with another functional activity (e.g., logging). Therefore, at this level, tangible, functional and symbolic territories intermingle, donating life and spirit to the geographic continuum. Yet contested situations are the rule rather than the exception. Local territorial level is not synonymous with indigenous community. Other non-indigenous communities, such as pioneers, immigrants and even emigrants from their place of origin currently expatriate may also qualify as local territory type communities as long as the time of occupation is long enough explicitly to show their engagement and symbolic attachment to the geographic continuum established by traditional practices created by the natural resource-man-made relationship. Urban neighborhoods sharing similar socio-economic classes eventually turn into local territorial identities too. Indigenous communities, nonetheless, often fit as excellent candidates if their traditional practices have not been significantly diminished.

Spatial boundaries of the local territorial level range from tangible to fuzzy owing to the fact that one spatial unit may be devoted to multipurpose functions (Fig. 1). Local level is crucial for implementing actions and is, in consequence, regarded as a motor of development at the municipal level (Jalomo-Aguirre 2009). At this level, space is highly contested because it represents livelihoods and power. Decision-making is also contested, such that open alliances with regional level decision makers are crucial to enforce laws. Because of the contested prevailing framework, this level is rather vulnerable and often unstable in comparison with the regional, national and supranational levels. At this level, rural-urban centers share the ruling role, while the rural ones prevail in most developing countries.

The supranational territorial (global) level emerged through the configuration of clusters of nation-states (the European Union, North American Free Trade Agreement, MERCOSUR) to address common economic interests, taking into account historical and cultural backgrounds. These are predominantly tangible and gain territorial functionality no longer through the notion of sovereignty, but rather through systems of planning, policies and processes agreed upon by the governments of member nations. Supranational territories are mainly functionally driven and allow the rise of so-called cross-border or trans-border regions, as the case of Western Europe (Zonneveld and Stead 2007; Knipps child and Wiechmann 2012; Peyrony and Denert 2012). These territories have also become relevant spatial entities for attending to environmental problems in order to minimize negative effects as a result of their land-use practices affecting natural resources beyond their borders, sometimes jeopardizing planetary sustainability (Conca 1994). In the symbolic dimension, these supranational territories are palpable in contrasting ways. One of them is the ethno-territorial conflict where national identities are unrecognized through divisions created by the limits of modern states. Conversely, advances in the reconstitution of symbolic territories across state borders have been reached through the recovery of the cohesion based on historic identities as in the case of the Catalan territoriality expressed in Spain, Andorra and France (Prytherch 2010). A number of examples can be seen in the trans-boundary parks in Africa and shared river basins in Mexico and in the USA as well as in many other instances where this supranational territorial level becomes relevant. At this level, urban centers play the ruling role, since centralized governments make most decisions.

IV. Territorial Configuration Approach

We define territorial configuration (TC) as the array of tangible (administrative), functional and cultural territories that co-exist and overlap across different hierarchical levels. In consequence, the geographic continuum is dissected into territorial conglomerates delimited by a range of meaningful socio-historical boundaries. TC harbors a unique array of stake(right)holders with legal and legitimate rights over the space (hereafter referred to as spaceholders). Accordingly, it is unequivocally place-based dependent (Fig. 2).
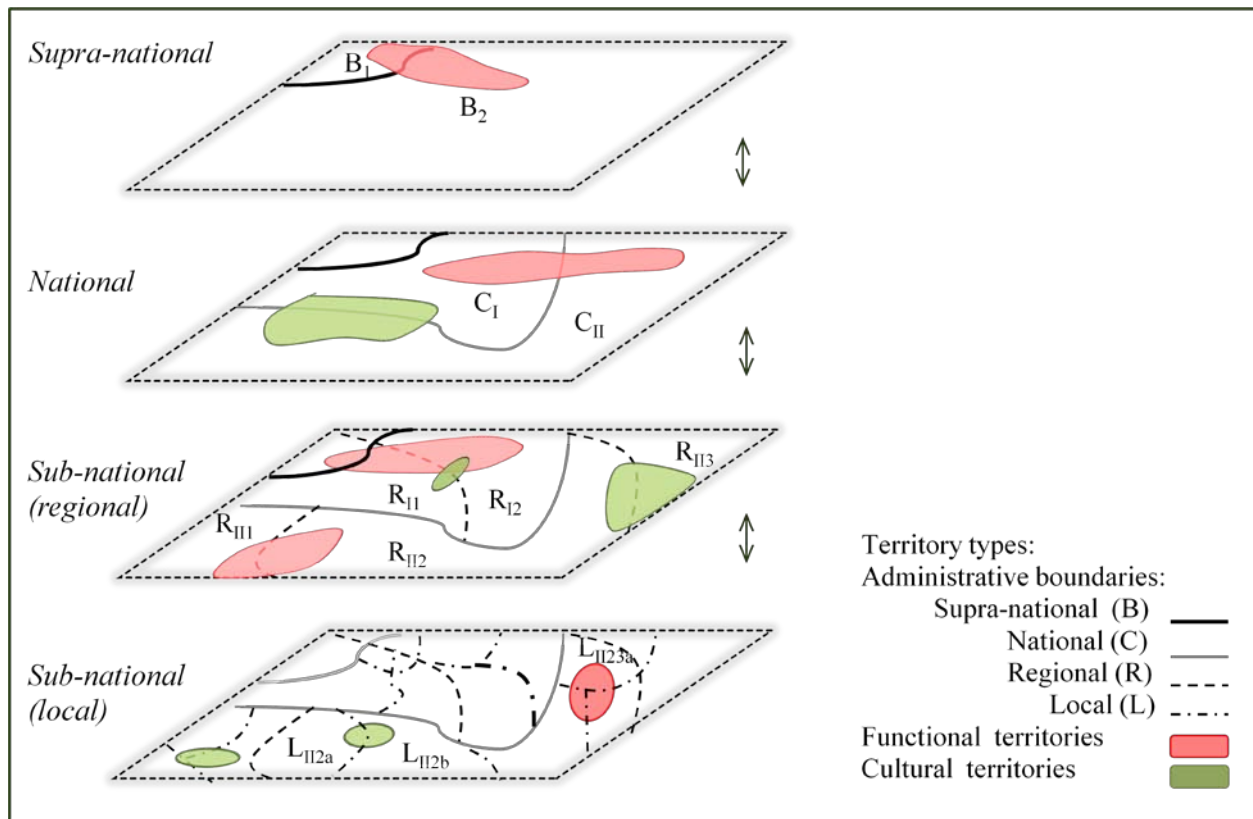
Figure 2: Types and hierarchical levels of territories dissect the geographic continuum forming territorial configuration (TC) conglomerates. The Territorial Configuration approach is meant to provide a common ground where both perspectives may match, namely, jurisdictions, laws and normativity as well as belonging, identities, historical charge, contested spaces and socio-economic functionality. B stands for blocks of countries clustered at supranational boundaries; C is for country boundaries; R is for regional boundaries and L for local boundaries.

From a functional perspective, TC embraces multiple fluxes (matter, energy and information) controlling unstable stages and changing processes throughout territorial conglomerates, thus resulting in non-linear dynamics, such that outcomes are tagged with a high degree of uncertainty. These input-outputs change into internalities or externalities when moving through territorial conglomerates along their path from their departing point toward the endpoint (Fig. 2). Taking into account that fundamental issues in decision-making on environmental management comprise consensus, collaboration and coordination, TC constitutes a benchmark for unified space, function and spaceholders. Three underlying attributes of TC sustain this statement. First, governing spaceholders are identified through their territorial engagement; second, spatially explicit relationships are established to recognize internalities and externalities; third, a negotiation process among spaceholders can be envisaged and strategic pathways leading toward the creation of territorial pacts and agreements may, therefore, be established.

Ambiguity and uncertainty often result from uncoupling actions of the spaceholders, who are distributed across all hierarchical territorial levels.

Because of the spatially explicit character of the TC, ambiguity and uncertainty are diminished because of the need to understand that multiple resources are managed-administrated by multiple stakeholders distributed along a geographic continuum where limits overlap. In response, sound communication is enhanced, and, trust is established easing the implementation of environmental programs. Territorial configuration, in addition, serves to identify key social actors from all territory types as well as any hierarchical level. By understanding the arrangement and the pondered role of these key social actors, agreements, pacts, rules and eventually effective EM may be pursued.

We further state that understanding TC implies admitting that no single EM action will be equally effective in all spatial units. The Territorial Configuration approach here described, places the fact that any environmental management action to be implemented will face opposition. The Territorial Configuration approach takes it as implicit that bottom-up and top-down space holders might be brought together in order to design place-based environmental policies, programs and actions. Consequently, tradeoffs and win-win scenarios are feasible as a crucial first step to regulate

access to spaces based on reciprocity, shifting to a needs-based rather than rights-based negotiation strategy. To summarize, the Territorial Configuration approach provides meaningful grounds for the processes of decision-making on environmental management (Fig. 3).
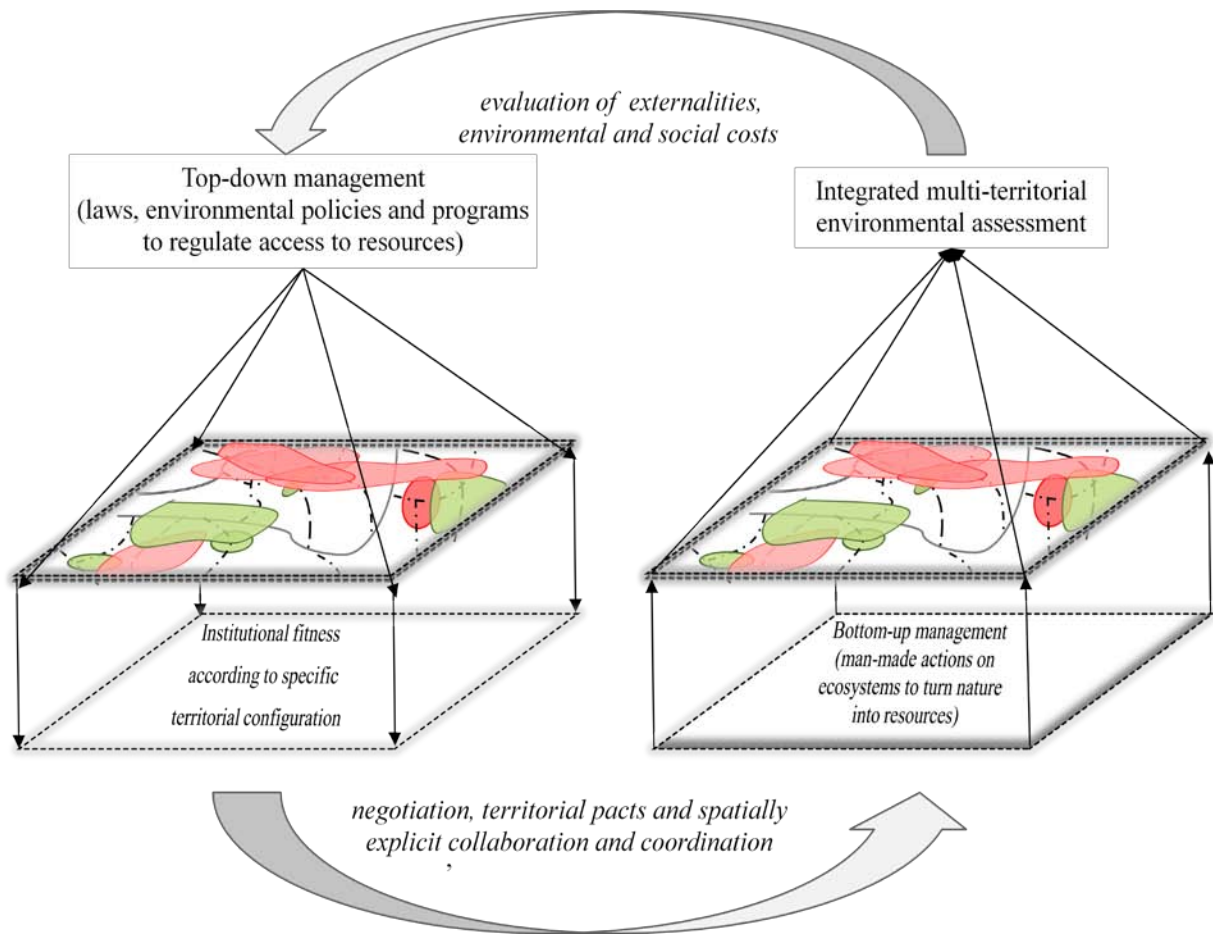
Figure 3: Schematic representation of the virtuous cycle comprised within the Territorial Configuration approach.

Here we portray the cyclical relationship between top-down and bottom-up approaches often unsuitable among institutional organizations, space holders and places. TC conglomerates are crucial for governing national and supranational levels designing policies to regulate access to natural resources (top-down vision). Complementary, bottom-up EM initiatives also adapt their management to their TC. The probability of merging environmental policies with management actions increases because both approaches share the same ground. In addition, because of the place-based institutional framework, pacts, compromises and agreements needed to trigger management actions at regional and local hierarchical territorial levels are feasible too. Environmental actions, even if these are articulated through top-down and bottom-up approaches, trigger positive and negative internalities and externalities. Governing national and supranational levels are able to assess the impact and eventually reorient EM toward sound environmental programs. This dialectical relationship needs to be adapted on an ongoing basis, since TC is invariably changing.

V. Discussion

Mexican environmental policy has largely neglected the concept of territory, and overemphasis has been placed on concepts such as ecosystems and, recently, socio-ecological systems (Sarukhán et al. 2015). Environmental management policies targeted at watersheds (Burgos and Bocco 2015) and biodiversity conservation (Bray et al. 2005) are primarily designed following a top-down approach, disregarding TC conglomerates. Despite of all these examples, successful medium- and long-term operation has yet to be ascertained. Disarticulated sector-oriented policies increase uncertainty and diminish trust, such that weaknesses and failures are mainly found in the implementation, monitoring and adaptation phases at regional and local levels (Figueroa and Sánchez Cordero 2008, Velazquez et al. 2009). Most regional and locally driven environmental management programs lead to unsustainable actions, since political will (meaning economic and technical support) is not likely to accommodate initiatives originating with local

governments, even where legitimate decisions underlay (e.g. peasant reserves). Disruption of the dialectical relationship between top-down and bottom-up processes increases the number and intensity of conflicts among and across territorial conglomerates. In sum, Mexican environmental management initiatives have lacked the dialectical relationship provided by the Territorial Configuration approach.

For a number of decades, the space concept in applied ecological sciences has remained a sticking point (Kareiva and Wennergren 1995) and has often been regarded as a socially empty unit. The revisited concept of territory portrayed here in a semantic map provides an overview of the multipurpose understanding of space. It is argued that territory is a continuous process of spatial construction, permitting socio-ecological systems to be better understood and eventually effectively managed by regarding the underlying Territorial Configuration. Various authors (e.g., Pahl-Wostl 2009; Moss and Newig 2010) hold that the Territorial Configuration approach may serve as a robust starting point from which to operationalize Environmental Management (Table 1). As previously explained, territorial configuration encompasses a clear notion of space, spaceholders and tangible and cultural proximal and multi-level governing processes (Mikulcak et al. 2013). Understanding this underlying complexity, negotiations, pacts, agreements and reciprocal collaboration are feasible. The Territorial Configuration approach implies reviewing the structure and composition of stakeholders involved in decision-making processes. Rather than sector-oriented stakeholders, this approach empowers genuine and legitimate spaceholders to be enlisted so that one common environment a lissue engages neighborhood, contagion and vicinity principles. This engagement leads to pathways toward facilitating governance as a critical component so far over looked in most literature related to Environmental Management (Newig and Fritsh 2008).To illustrate this further, ethnic, political (power), economic and religion-driven cultural features have triggered some of the worst human environmental transformations with global implications. These are the reasons why understanding territorial configuration of space is crucial in finding reconciliatory paths forspaceholders to follow in order to construct new territories from which innovative man-made actions may maximize environmental internalities and minimize externalities (Larson 2010). At this stage, governance and co-operation are likely to be included as a critical route to enforcing rules for a common purpose (Lockwood 2010).

Robust construction between the Territorial Configuration approach and Environmental Management force us to recall that, according to Aguilar (2009), public policy comprises four compulsory and sequential steps, namely, identification of the target, design, implementation and monitoring-adaptation. In addition, Margerum (2008) has pinpointed that frequent atomization and mismatches between sector-oriented policy formulations at high organizational levels remain the major challenge in Environmental Management. Along this line, the Territorial Configuration Approach provides the driving force and basis for environmental policy makers from different sectors to articulate programs and actions. Policy makers should be geared toward common targets according to specific territorial capabilities. Territorial capabilities imply identification of spaceholders who, ideally, should participate actively in all four steps of the public policy cycle. Design of shared programs and actions to be implemented with regard to specific spatial conditions reduce uncertainty and increase trust among spaceholders (Odom et al. 2015). In consequence, the ability to trigger negotiations and pacts in addition to medium- and long-term agreements based upon mutual benefits is developed (Fisher et al. 2012). On the whole, the Territorial Configuration approach may drive Environmental Management into a more effective, concrete and operational framework, making the management of negative externalities more efficient. Eventually, the Territorial Configuration approach should help to avoid policies likely to be antagonistic. These often increase uncertainty and discourage spaceholders (Table 1).

Table 1: Synthetic comparison among prevailing issues to overcome in sustainable management and improvements reached by following the Territorial Configuration approach.

Attributes of Sustainable Management	Prevailing issues to overcome	Improvements reached by following the Territorial Configuration approach
Conceptualization of geographic space	Scanty perception of the process controlling the space as a social construction.	Geographic continuum dissected into territorial conglomerates delimited by a range of meaningfully socio-historical liaison (e.g., place-belonging-engagement-control).
	Geographic framework is only conceived as pixels or biophysical units leading to the disarticulation of ecological and geographical levels of organization.	Ecological and geographical levels of organization are clearly articulated throughout intermingled territorial conglomerates.
	Vagueness in depicting place-based exter(inter)nalities.	Stakeholders producing place-based positive or negative exter(inter)nalities are revealed.
Composition of decision-making structures	Dictating role of administrative (tangible) territories at high organizational levels (supra-national or regional) illustrated by basin councils, advisor boards).	Non-tangible territories (functional and cultural) could be as well visualized, so that more comprehensive decision-making structures can be integrated.
	Place-based key stakeholder are excluded when forming decision-making structures (illustrated by contagion, up-down, nested territories), diminishing likely negotiations.	Negotiation potential increase because weighted role of place-based key stakeholders are anticipated and based upon specific environmental problems.
	Lack of legitimacy in decision making´s structures due to the composition of decision makers often enrolled arbitrary.	Increasing legitimacy because of the supported composition of place-based decision makers.
Capability for favoring institutional (governmental) coordination	Ill-coordinated, mismatched and ungrounded public environmental policies due to the fact that these are sector-oriented.	Fitting public environmental policies to specific territorial configuration.
Abilities for conducting collaboration	Increase of uncertainty and distrust among stakeholders because environmental public policies are detached from the reality of other.	Increase of certainty and trust among stakeholders when environmental public policies are devoted to common territories so that from the reality of other are not mismatched.
	Lack of awareness of socio-cultural background that limits collaboration between vertical and horizontal stakeholders.	Acknowledgment of territorial boundaries that favors collaboration for building territorial pacts, and vice versa.
	Facilitator fails as mediators in solving stakeholder´s conflicts.	Stakeholder´s conflicts may be solved through more effective strategies for building territorial pacts.
Efficiency for negative externalities management	A functional criterion for environmental externalities assessment uniquely weakens efficiency for implementation of mitigation and control actions.	Integrated territorial environmental assessment for improving management of externalities among stakeholder´s responsibilities.
Coherence and dynamics for adaptive learning processes	Disconnected top-down and bottom-up processes so that contested situations prevailed.	Territorial Configuration approach constitutes a common ground for triggering dialectical relationships between top-down and bottom-up decision making processes.

Top-down perspectives dominated by policy makers build the 'reality' around administrative territories at high institutional levels. In contrast, bottom-up perspectives in regional and local spaceholders build their 'reality' around daily life practices derived from tangible, functional and cultural territory types carved outby tacit-empirical knowledge. This mismatch is known as "levels of reality" within the transdisciplinary approach (Nicolescu 2010). The Territorial Configuration approach provided here is meant to serve as common ground where all perspectives can match, namely, jurisdictions, laws and normativity in addition to belonging, identities, historical charge, contested spaces and socio-economic functionality. Contrasting levels of reality ought to be brought together and this approach may serve to do so. This bridging effect refers to literally "the logic of the included middle" described within the transdisciplinary approach by Nicolescu (2010). The Territory Configuration approach may be considered as a surrogate of the included middle because it contains the logic of administrative boundaries in the form of other territorial boundaries linked to different perceptions. Although contrasting perspectives will remain, the building of a shared vision on environmental issues is likely as a consequence of re-connecting the dialectic relationship between top-down and bottom-up perspectives (Table 1 and Fig. 3). This has been identified as the core of the multi-level governance framework (Moss and Newig 2010), governance networks (Newig and Fritsh 2008;Netwig et al. 2010) and knowledge systems, leading to flexible adaptive capacity and triple-loop learning processes (Cash et al. 2003; Fazey et al. 2007; Pahl-Wostl 2009).

VI. Conclusion

We state that the Territorial Configuration approach provides a sound geographic framework for linking a holistic perception of natural resources as well as past and present socio-economic underlying forces. this approach furthers, serves to resolve the misfit across multi-level state and non-state governance actors. The review on Environmental Management and Territory concepts reveals that territorial configuration of space permits an understanding of the complexity behind Environmental Management occurring along the geographic continuum. Emphasis was given to considering reciprocal connections and dialectical relationships, which determine the continuous construction of emerging territories. In order to reduce the conceptual mismatch between ecological concepts and Environmental Management actions, we suggest a Territorial Configuration approach as a critical pathway.

The outreach of the territory-oriented approach to operationalize Environmental Management in moving forward sustainable science has yet to be ascertained (Miller et al. 2014). Other conceptual approaches so far de-territorialized, such as socio-economic systems, governance and resilience fostering sustainable transitions may also be enriched (Folke et al. 2011; Fabinyi et al. 2014; Norström et al. 2014). It is, therefore, concluded that neither ecosystem nor socio-ecological-system concepts have encompassed a robust platform around which key spaceholders can unite. It is certain, however, that these previous approaches lacked a sound geographic perspective and therefore practical implementation is becoming a burden that needed to be transformed into an opportunity.

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