

## Landscape planning and polycentricity: potentialities for regional integration in transboundary natural resources

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### Abstract

This article proposes a discussion on the potential application of polycentricity strategies in the management of strategic transboundary natural resources, such as shared water bodies and river basins with regional potential for water supply and energy production.

As a method, it presents a review of the literature on polycentricity, focusing on the challenges and opportunities of governance of shared territories among polycentric cities. It identifies key aspects of polycentricity, focusing on topics such as the integration of cities in polycentric urban regions, regional policies and governance in polycentric regions, and polycentricity and natural resource management.

Complementarily, potential landscape planning strategies that can be applied to strengthen regional identity between centralities, as well as to strengthen the functional, institutional and cultural identity and integration of a polycentric region, are also presented.

## 1. Introduction

Traditional concepts of metropolitan regions used to be centered on the idea of a single large city: urban agglomeration in its classical form refers to a highly urbanized area that usually consists of the center of that territory – one or few larger cities and hinterland with towns and rural centers with strong mutual connections. However, in contrast to the standard concept of a monocentric urbanization composed of a centralized zone and peripheral rings, polycentricity consists of different urban centralities and a shared territory between them.

The American economist E. Ostrom (2001), defines that “Polycentric systems are the organization of small, medium, and large-scale democratic units that each may exercise considerable independence to make and enforce rules within a circumscribed scope of authority for a specific geographical area”.

To Aligica and Tarko (2013), “Polycentricity is an institutional arrangement involving a multiplicity of decision centers acting independently but under the constraints of an overarching set of norms and rules that restrict externalities and create the conditions for an

emergent outcome to occur at the level of the entire system via a bottom-up competitive process". Meijers, Hoogerbrugge, and Cardoso (2018), for instance, defines that 'polycentric urban regions' (PURs) are clusters of historically and administratively distinct but close and well-connected cities of relatively similar size.

## **2. Materials and Methods**

The research for this article investigated several papers relating the themes of polycentricity, governance, and natural resource management, with the following steps:

Problem definition and scope; literature research; Discussion and Final Considerations.

## **3. Key aspects and themes in polycentricity**

After a literature review, some key aspects of this theme are addressed by different authors as common success factors for the development of an urban police region. These are:

1. cities integration in polycentric urban regions.
2. regional policies and governance in polycentric regions and,
3. polycentricity and natural resources management.

Finally, to demonstrate a practical relation of the key aspects listed below with landscape planning "landscape phenomenology as an opportunity to strengthen cultural interactions with the territory" will be discussed briefly, demonstrating some opportunities to explore some forms of polycentric integration in landscape planning.

### **3.1. Cities integration in polycentric urban regions**

Meijers, Hoogerbrugge, and Cardoso (2018) explored whether the level of integration between cities making up a polycentric urban region (PUR) influences the PUR's performance. For that research it was identified and indexed a list of 117 Polycentric Urban Regions in Europe showing that stronger integration between cities in a PUR increases the presence of metropolitan functions, in an assumption that infrastructure and networks can be an alternative to some proximity agglomeration benefits.

To measure the effects of the integration between Polycentric Urban Regions, the authors point out and discuss three forms of integration, and their positive association with performance:

1. functional integration.
2. institutional integration.
3. and cultural integration.

Throughout the article, they define comparative metrics for each of the three types of integrations among the 117 Europeans PURs. Basically, these forms of integrations were measured by functional coherence related to infrastructural road, rail and train connections; Institutional coherence was measured by the presence of a metropolitan body, number of years active and Type of partnership and Cultural coherence, measured by political preferences homogeneity and language.

Aiming at reinforcing the process of region-building, Meijers, Hoogerbrugge, and Cardoso (2018) proposes a set of questions based on the three forms of integrations to be explored in future essays, as follows:

FORMS OF INTEGRATION IN POLYCENTRIC REGIONS	EXAMPLE OF MEASURED INTEGRATION EFFECTS	EXAMPLE OF FUTURE THEMES TO BE EXPLORED
FUNCTIONAL INTEGRATION	related to infrastructural road, rail and train connections;	the relevance for performance of a particular division of labour between cities; the functional polycentricity of the region.
INSTITUTIONAL INTEGRATION	presence of a metropolitan body, number of years active and type of partnership.	finer distinctions among metropolitan governance entities, capturing national regulatory specificities and historical legacies;
CULTURAL INTEGRATION	political preferences homogeneity and language	a more comprehensive set of cultural integration indicators reflecting for instance differences in ethnicity and religion, or perceptions of identity-building at PUR scale.

**Table 1:** Forms of integration in Polycentric regions: Example of measured effects and future themes to be explored pointed. Adapted from Meijers, Hoogerbrugge, and Cardoso (2018)

According to their results, more integrated cities tend to perform PUR's better (table 01). The premises are:

- The stronger the cities in PURs are functionally integrated, the better their performance in the sense of organizing urbanization economies.
- Institutional integration, or metropolitan governance, has a positive effect.
- Most important if there is some form of metropolitan co-operation, but its exact shape and scope seem of secondary importance.
- There is no evidence that the link between integration and performance is different according to the size or the location of the PUR or to being cross-border.

### **3.2. Polycentricity, regional policies and governance**

For polycentric policy and governance approaches, it is well-established the concept of multiple centers of decision-making based on a way of guaranteeing that decision-making is in the common interest of the participating cities.

Going further, V. Ostrom, Tiebout, and Warren (1961) introduced the concept of polycentricity to the political science and public administration literatures as a way of making sense of the fact that most metropolitan areas in the United States lacked a single dominant political leader, but instead included many local public authorities. Their basic point was that people living and working in densely populated communities wanted a wide range of local public goods. However, different goods are most efficiently produced at different levels of spatial aggregation.

On the other hand, Marshall, McGinnis, and Stephan (2019), throughout his article presents a historical overview of political episodes in Police Central regions, as well literature research on the subject. He manages to outline some common characteristics for the cases of Management and Governance of PUR areas. Based on this, the author concludes that, eight basic characteristics are necessary for the success of a PUR Governance. These are:

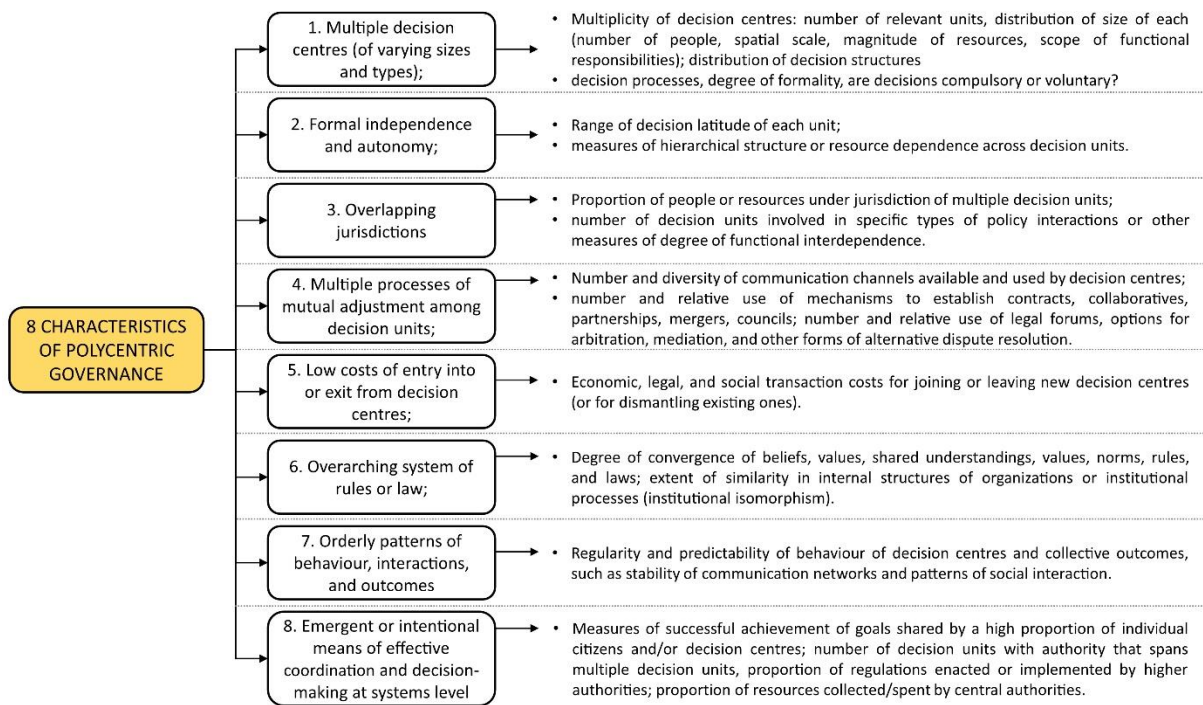


Figure 1: The eight basic characteristics of a successful polycentric governance.

Adapted from Marshall, McGinnis, and Stephan (2019).

Therefore, in summary, polycentric governance would be any form of governance that has a mixture of the dimensions described above (Figure 1), but it would at least include the first and second characteristic, besides the idea that each dimension can be logically arrayed from 'less' to 'more'.

Secondly, polycentric governance systems would be based on the first four characteristics, at the least, but it could include some degree of each of the second four characteristics.

In any case, regardless of the organization process, there may be decision centers in such cities governments that have an independence for local scale challenges and benefits.

### 3.3. Polycentricity and natural resources

As a consequence of the urban, institutional and cultural dynamics of a polycentricity being shared between different centralities of a given region, the shared territory gains an evident role in the institutional debate, as a physical means of support and connector, where the dynamics of integration between cities constantly occur (see item 8, Figure 1).

This happens because, morphologically the traditional monocentric dynamics presents a relationship of centrifugal territorial expansion, starting from the protagonist of a more developed urban centrality to its peripheries. On the other hand, the concept of polycentricity starts from the assumption of fusion, where the urban dynamics of different centralities are interdependent protagonists and merge in a shared way, in a territoriality available between them.

Because of this, policies and models of polycentric governance have been gaining popularity in natural resource management. This can be attributed to expectations that polycentric governance systems have greater capacity to deal with territorial complexities of environmental services and climate change that overflow traditional political boundaries. More specifically speaking of the management of watersheds, many of water management systems problems are associated with failure of governance and management regimes.

With an approach of urban centralities facing the challenges of Environmental Change and climate change, Pahl-Wostl and Knieper (2014) demonstrated the need for decentralization of decision-making with policies of participatory coexistence in a Polycentric Governance System, reflect on a regional decision making the interscale principles of action and impacts, with at least two criteria for the functioning of PURs as systems: presence of multiple decision-making centers and coordination by a comprehensive system of rules.

Moreover, Meijers, Hoogerbrugge, and Cardoso (2018) also used a morphological perspective to identify PUR regions, as well characterized their balanced size accordingly to the limitations of infrastructure in a region and the distribution of urban agglomerations on the land. In their paper, it is also noticeable that the Institutional integration on European Polycentric regions its very related to the cultural coherence a regional and topological identity, such valleys, coastal areas, or alpine regions.

Pahl-Wostl and Knieper (2014) analyzes the underlying feature of effective polycentric governance and makes a distinction between polycentric, fragmented, and centralized governance regimes. In their article, they demonstrate through a data base of twenty-seven watersheds that fragmented and centralized governance can be related to low performance watershed policies. In addition, the research also identifies the importance of formal institutions focused on the management of the river basin, for those who are looking to improve management efficiency in existing water resources policies.

#### **4. Landscape phenomenology as an opportunity to strengthen cultural interactions with the territory.**

In environmental sciences watersheds are constantly used as an influence area of forestry, soil, and water flow studies. Also, historically the same topographical and hydrological conditions were crucial for the choice and creation of settlements and cities: the experience that a certain territory provides, combined with the ability it has to offer supply and shelter was responsible for determining the settlement sites and especially the different ways of living.

From a sociocultural standpoint the phenomenological perceptions of individuals towards geographical landmarks have always been determinant for establishing a sense of belonging, location, and direction, giving new meanings to the relationship between men and landscape – whether related to the sense of shelter and protection, subsistence, and in some cultures, a sense of divine. From mountain ranges to water bodies, normally watershed boundaries are easily perceived: three-dimensionally, in first person, along the horizon line.

Within the scope of cultural perceptions of the landscape, in the essay “Between Geography and Landscape, Phenomenology,” from Jean-Marc Besse’s book “See the Earth” (2014) the French philosopher raises a series of distinctions and oppositions between geographic space and landscape, by highlighting the difference between feeling and observing. One of the central points of Besse (2014) argument is that this distinction occurs because the landscape is associated with a local perception, and it is distinguished when the individual moves and guides himself along the horizon line. Inversely, geographic space has no horizon; it defines states, positions and situations perceived by general and objective coordinates and references. According to the author, the determination of a Cartesian center (*i.e.*, a map under the coordinate system) instead of the ordinary idea of a center determined by the individual’s perspective it causes decentralization. Therefore, with this new perception of the individual the landscape is experienced differently.

In a complementary manner, approaching the relationship between constructed environment and landscape, the Norwegian theorist Christian Norberg-Schulz (1979) in the renowned work "The Phenomenon of Place" (1979), perceives the phenomenological potential of architecture as the ability to give meaning to the environment, defending the activity of building as a revelation of meanings and human identities that are sensitive to a certain environment. According to Schulz, the act of building is a cultural positioning, a decision making, that reflects a man's position within the reality that surrounds him.

Furthermore, in a geographical diversity environment, the site presents a huge possibility of cultural development: each territory variation results in a different anthropic answer.

Norberg-Schulz (1979) reveals the importance of anthropocentric activities to assign the value of "place" to a specific "environment"; by defending construction activities as a revelation of meaning and human identities sensitive to a particular environment, it suggests that the reality that affects us as men, is what we express through the building.

In spatial terms, these answers of men to its surroundings are noticeable in the material and immaterial heritage, such as constructions, utensils, and artifacts of human interaction with the territory and the availability of natural resources.

From a sociocultural point of view, the phenomenological perceptions of individuals towards both natural or constructed landmarks have always been decisive for the relationships of belonging, location and direction giving to these landmarks a new meaning and can be applied to reinforce the regional identity between the centralities, as well strengthening the identity and integration of a shared region.

## **5. Discussion and Final Conclusions**

The literature review opens an opportunity to debate the union between Landscape planning and Polycentrism approaches, and how these can contribute to Transborder Natural Resources Planning and governance. Through a more participative and decentralized management in regional decision-making, institutional integration in polycentrism tends to facilitate the management of land use, distribution of natural resources and climate issues.

More specifically, when relating some key concepts presented in this article, landscape planning aligned with polycentrism policies and governance for the management of a natural resource region, can help to redefine the relationship of the multi-centralities with their surrounding landscape and its ecosystem services in two complementary strategies: measuring to value and value to measure.

- **Measure to value the functional aspects of the landscape:**

In the same way that it already happens with the gray infrastructures of connection between the centralities, the possibility of, through landscape projects, to stimulate the functional integration of the settlements with the natural resource, through the key concepts of ecosystem services and green infrastructure. The literature suggests that there is a possibility of measuring social and economic benefits of a given natural resource for that region.

- **Value to measure the cultural aspects of the landscape:**

The possibility of, through landscape projects, stimulating the cultural integration of the inhabitants with the territory, through the key concepts of landscape phenomenology and topology. previous experiences and the bibliographic review suggest that there is a possibility of valuing regional cultural relations through the sense of belonging, location and connection between isolated centralities made possible by landscape interventions.

Furthermore, the cited articles suggest that more integrated cities tend to performers PURs (Polycentric Urban Regions) better. In general, the authors cited along this paper seem optimistic regarding investments in PURs as a viable and profitable alternative to Monocentricity and Urban concentration, avoiding several problems faced in large contemporary cities such as saturation of sanitation systems or transportation. From a social point of view, it represents an alternative to recurring problems such as the lack of housing close to the mono centers of decision and work, real estate speculation and gentrification.

However, the cited articles lead to the conclusion that the main challenge of the PUR's is to have a central agreement in polycentric policies and a harmonious governance between its multiple decision-making centers. Meijers, Hoogerbrugge, and Cardoso (2018), argues that the main challenge in PURs is to move from fragmentation to integration. Polycentric Urban Regions need to become integrated functional entities to reap the benefits of their aggregated size as a fully-fledged metropolitan environment.

Since there is a relation of exchanges and dependencies between functional, institutional, and cultural activities in polycentric cities, the greater the capacity of a landscape project to intensify cultural aspects of the place, aiming to strengthen a sense of belonging, identity, and regional integration. This goes beyond the obviously required investments in connecting infrastructure and inter-urban public transit. Aligned with the thought of Marshall, McGinnis, and Stephan (2019), "what is needed is a larger process of region-building also referred to as 'metropolisation', in which the economic, functional, administrative and sociospatial qualities and features once attributed to the 'city' are reconstructed by citizens, firms and institutions at the scale of the PUR".

For that to succeed, it is inevitable to contextualize the cultural integrations concepts presented by Marshall, McGinnis, and Stephan (2019), in a strategical plan where behavior patterns, interactions and political alignment become key factors that must be encouraged for long-term success between cities within the same polycentric zone.

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