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Is it possible to generalize and map cultural ecosystem (dis)services?

Reflections based on the study of green spaces in France and sylvosystems in Việt Nam

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Abstract

Ecosystem services (ES) is now a fashion concept. But some questions remain, especially on generalizability and mapping. Which method using? Some researchers suggest basing ES assessment on land use map: a given ES is associated to a land use category. It is feasible for provisioning services; what about cultural services (CES)? This article questions this methodological point and the link between ES and landscapes in two different contexts: French urban green spaces (UGS) and Vietnamese sylvosystems, basing on interviews.

In France, UGS are leisure, relaxing or meeting areas. CES can differ according to UGS categories. We could think mapping ES from UGS map. But the association is not so easy, even contradictory. Generalization is difficult, what compromises CES mapping.

In Việt Nam, CES associated to sylvosystems also differ, according to ethnic groups: forest is considered as sacred or with repulsion. CES map could be based on ethnic groups localization. But the sacred nature is not attached to all forests and these CES varied over time.

The link between landscapes and ES is heuristic, because these concepts question the interrelations Man-Nature, in an interdisciplinary way. But, as it is difficult to include various landscapes assessments, it is difficult to generalize and map CES.

Key Words

Cultural ecosystem services; landscapes; map; urban green spaces; sylvosystems

Introduction

Ecosystem services (ES) concept was popularized in 2005 by the Millenium Ecosystem Assessment (MEA, 2005), which defines it as “the benefits people obtain from ecosystems”. This book gives a typology of these services, which we also use to focus on the cultural category: “*These include provisioning services such as food, water, timber, and fiber; regulating services that affect climate, floods, disease, wastes, and water quality; cultural services that provide recreational, aesthetic, and spiritual benefits; and supporting services such as soil formation, photosynthesis, and nutrient cycling*”. This MEA publication is a key event. Indeed, from 2005, the works on this topic increased (Jeanneaux, Aznar and de Mareschal, 2012). ES concept is now a fashion concept. It is used by many researchers. But some points are neglected. Indeed, disservices and cultural ES (CES) are less studied: “*Globally, the literature on ecosystem services tend to ignore “ecosystem disservices”*” (Rankovic, Pacteau and Abbadie, 2012, transl.); “While there is strong evidence that nature has a positive effect on physical and mental health (Hartig *et al.*, 2014), few studies have sought to systematically integrate multiple elements of human well-being into ecosystem service assessments” (Bryce *et al.*, 2016). The research also focus on case studies at local scale. It is a conclusion we achieved at the end of the symposium, which aimed to question the relevance of ecosystem services in urban environments, in Tours (France) in May 2016¹. The case studies are not necessary applicable in other contexts. Thus, some questions remain, especially on the possibilities to generalize the results from local to larger scale, from a site to others and thus to map these results. Which method can be used? Some researchers propose to link ES and landscapes. For example, S. Lavorel *et al.* (2011) “*propose a new approach for the analysis, mapping and understanding of multiple ES delivery in landscapes*”. But the landscapes are only mention as an analysis scale – we have another interpretation and use of this polysemous concept (see below). In fact, S. Lavorel *et al.* (2011) almost base their assessment on land use maps. They note that “*Ecosystem service assessments often make the assumption that ES can be mapped uniquely to land use or land cover (LULC) (Naidoo & Ricketts 2006; Verburg et al. 2009; Eigenbrod et al. 2010), especially at large scales where LULC effects are at best corrected by a few simple modifiers, such as coarse altitude or slope classes, or landscape heterogeneity for which extensive information is available (Kienast et al. 2009; Eigenbrod et al. 2010)*”. But they only complete by “*using abiotic variables and plant traits rather than land use alone*”. This method can be satisfactory for provisioning services. Indeed, the knowledge of these ones can be based on land use map, even if some complementary information is needed. For example, the forest plantations in Việt Nam provide firewood and this service can be easily identify and quantify, based on land use map, complemented by information on the ages and species of plantations. But what about CES? Is it possible to localize them using land use map? The study of CES implies to consider the perceptions of the users and (or) inhabitants: how do they consider the ecosystems? That is why more than land use, it is important to consider landscapes, taking thus into

¹ <https://se-urbains2016.sciencesconf.org/?forward-action=index&forward-controller=index&lang=en>.

account land use and the feeling and perception of the different landscape units from actors. Here, we indeed consider landscapes as spatial entities, which are perceived almost thanks to eyesight and interpreted by the observer (Da Lage and Métaillé, dir., 2000), knowing that they are composed by biotic, abiotic and anthropogenic elements, which are in interactions and make them change in time and space (Robert, 2011). This interpretation explains we insist on feeling and perception, all the more since they are important to understand CES. The purpose of this article is to question the possibilities of generalization and thus mapping these CES, in two really different contexts, based on two studies:

- The first one is about French urban green spaces (UGS). It was conducted in the framework of a research project (SERVEUR), funded by the French Region Centre-Val de Loire. The purpose was to identify CES of urban green spaces.
- The other study concerns sylvosystems of a Vietnamese rural area. It was carried out in a PhD framework (Robert, 2011).

Both researches are based on the same method, as we will detail in the first part. Then the results will be present and discussed.

1. Materials and methods, based on interviews

Both studies are based on interviews, to know the perception of landscapes by villagers and the CES, which users associate to ecosystems. We will present the method used for the research concerning the French UGS then the one followed for the Vietnamese sylvosystems study. Both works were conducted separately, without aiming to be compared, even if they are based on the same method (interviews). They are mobilized here because they offer two different contexts to question the generalization and mapping of cultural ecosystem (dis)services.

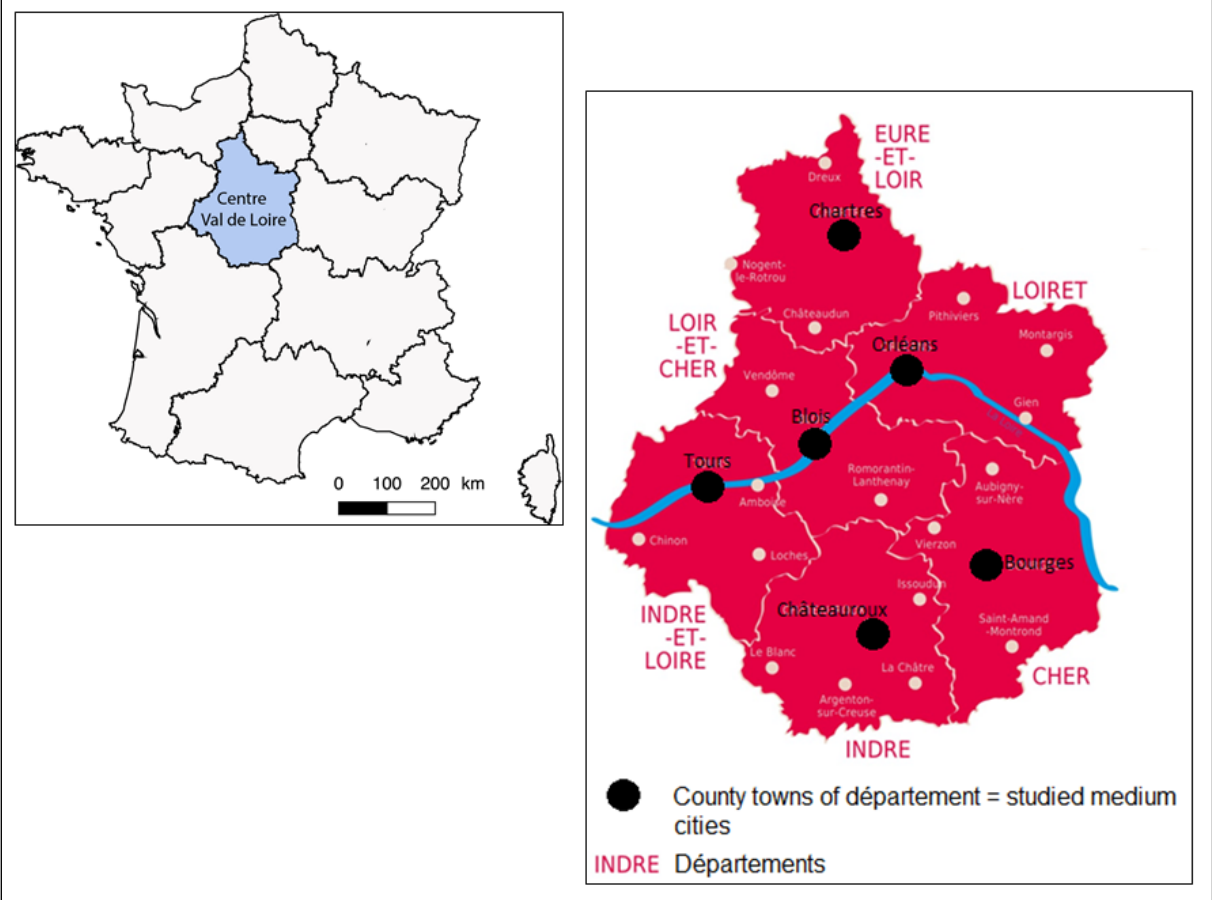
1.1. French urban green spaces

The UGS, which we decide to study, are localized in six medium cities, in the region Centre-Val de Loire in France: Blois, Bourges, Chartres, Châteauroux, Orléans and Tours (fig. 1). These cities were chosen because the most of the studies on this topic focus on the bigger cities. Their UGS were identified then classified in three main categories:

- forests or semi-natural spaces,
- ornamental gardens, which include historical gardens, neighborhood parks and large green spaces,
- allotment gardens (community gardens).

From the 52 identified UGS, six ones were selected for a more in-depth study; they were considered as representative of the UGS offer (fig. 2).

Figure 1: The six studied medium cities in the Region Centre-Val de Loire in France



Source of the Region Centre-Val de Loire map: CCI Centre-Val de Loire, modified.

Figure 2: The six UGS representative of the UGS offer and selected for a more in-depth study

A. Forests or semi-natural spaces

A1. Lazenay garden (Bourges)



A2. Saint-Gildas meadow (Châteauroux)



B. Ornamental gardens

B1. Historical gardens: Pasteur park (Orléans)



B2. Neighborhood parks: Central park (Chartres)



B3. Large green spaces: Arrou park (Blois)



C. Allotment gardens (community gardens)

Bergeonnerie gardens (Tours)



Shoots: Yengué and Robert, 2013-2015

Interviews were conducted *in situ*, in the six selected UGS, in supervised and semi-supervised ways. In total, 321 users of these spaces were questioned about their feelings and practices to identify the CES provided by these urban ecosystems. In each UGS, their number varies (table 1), mainly according to the frequenting of gardens. These interviews were completed by observations, which were conducted without participation in the same UGS. Moreover, other semi-supervised interviews were carried out with 12 UGS managers to have another point of view than the one of the users. An elected representative, a head of department and a technician were questioned in Blois, Bourges, Chartres and Châteauroux.

Table 1: Number of interviewed users

	Blois	Bourges	Chartres	Châteauroux	Orléans	Tours	TOTAL
Users	86	20	69	22	28	96	321

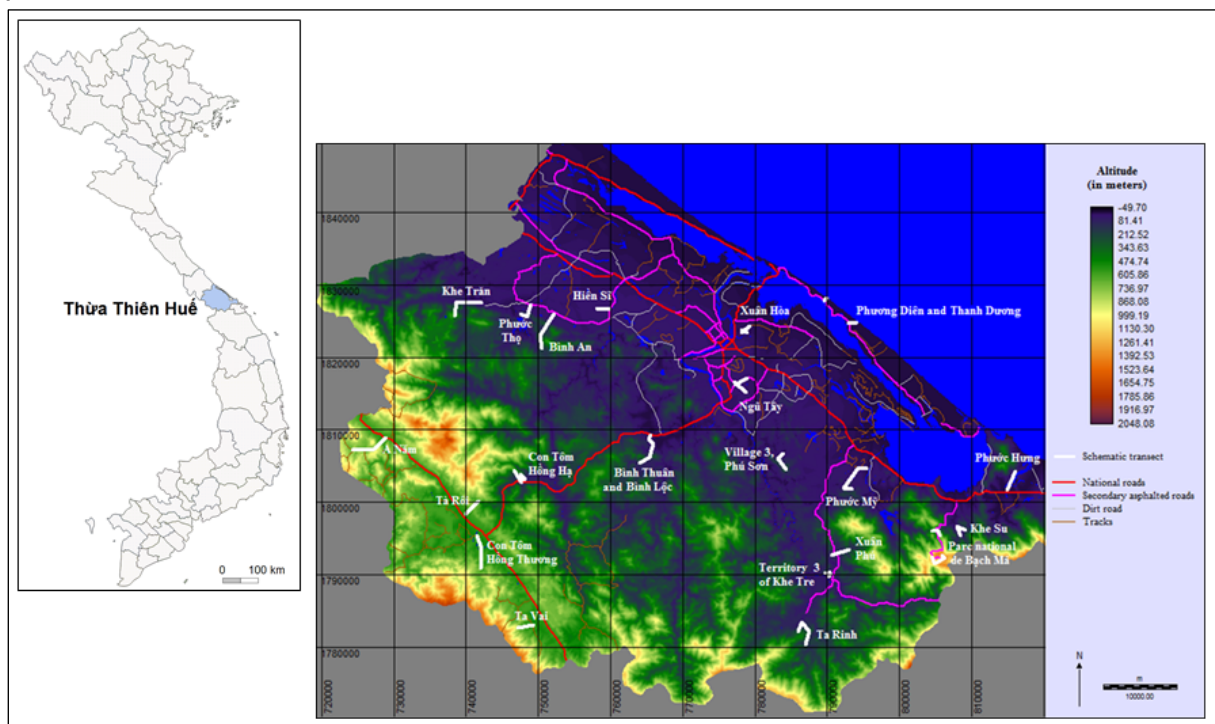
Interviews were also conducted in Việt Nam to know the perceptions of sylvosystems from villagers.

1.2. Vietnamese sylvosystems

The research on Vietnamese sylvosystems was carried out in the Thừa Thiên Huế province, which is located in Central Việt Nam (fig. 3). Twenty villages were selected in the three landscape units of the province: plain, hills and mountains.

Between three and five inhabitants were interviewed in each of these villages, in a semi-supervised way. Observations without participation and field surveys were conducted in these same villages, along transects, following trails – they are schematized on the maps (fig. 3). Historical information was also obtained thanks to the consultation of archives. The purpose was to know practices and the perceptions of sylvosystems by inhabitants, nowadays and in the past.

Figure 3: Localization of the selected villages and relief in the Thừa Thiên Huế province, Việt Nam



Sources: for the Việt Nam map, © d-maps.com, modified; for the Thừa Thiên Huế map: Robert, 2011, transl.

Interviews were thus the main source of these researches, allowing to know the CES in two different contexts, urban and rural, in France and in Việt Nam.

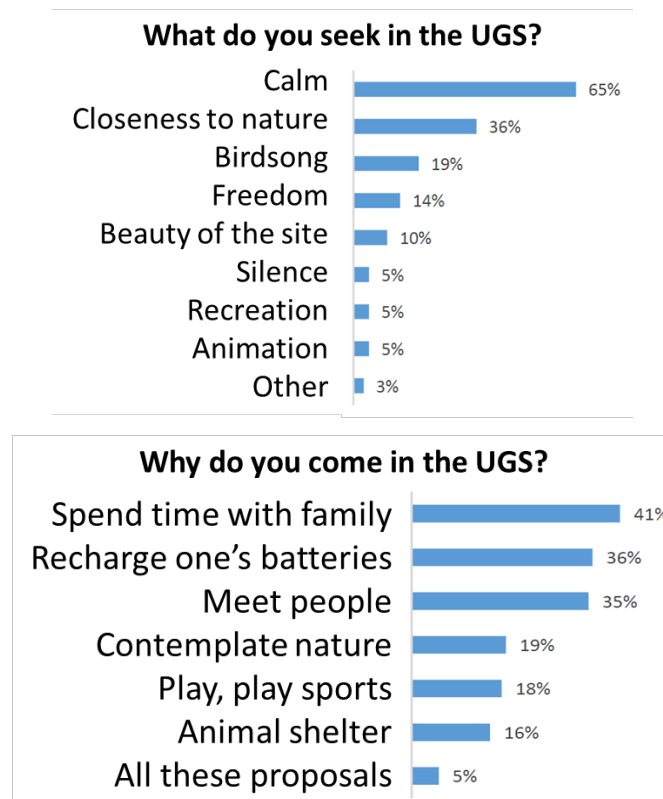
2. The results and their questioning in a perspective of generalization and mapping

Thanks to the used method, some CES of UGS in France and sylvosystems in Việt Nam were identified.

2.1. CES offered by French urban green spaces

UGS are a source of well-being. This idea is now known, shown by several authors like N. Long and B. Tonini (2012), C. C. Konijnendijk, M. Annerstedt, A. Busse Nielsen and S. Maruthaveeran (2013) or L. Bourdeau-Lepage (2013). Our research specifies that the users consider these spaces as areas of leisure, relaxing or meeting (fig. 4). We can thus assert that UGS provide CES. But how localizing these services?

Figure 4: Some answers given by the interviewed users



Source: Launay, 2014, transl.

We distinguished different kind of UGS and the first question is then the following one: is it possible to associate one CES with one kind of UGS? If the answer is positive, it means that it is possible to generalize the results to all UGS at least in the Region Centre-Val de Loire and thus to map CES from UGS map. But the association is not so easy. For example, the allotment gardens are particular. Indeed, they are areas to teach to the children, how to cultivate. But they can also be areas to walk like other UGS, as we can observe in Bergeonnerie gardens in Tours (fig. 5). From this remark, we could think that all UGS provide the same CES. But some activities depend on the land use inside the park. For example, Arrou park is a place to relax by going fishing because it includes a lake. But all UGS don't have a water area. The frequenting of UGS can also differ and, in this case, the land use is not necessarily at stake. Indeed, some UGS are less busy, for an unknown reason, maybe an external one: the environment. It was observed for example for central park in Chartres, which is an ornamental garden with facilities (fig. 2-B2). Moreover, urban dwellers can consider a

given category of urban nature sometimes as a source of CES, sometimes as a source of disservices. The example of trees is evocative. They are the first element, which the users mention as contributing to the well-being felt in UGS (fig. 6). But they are also considered as a source of disservices. Indeed, city dwellers complaint to managers about disadvantages of trees: pollen; leaves, which fall; dirt...

Facing with these variations and even contradictions, the generalization of the results appear difficult, what compromise the mapping of CES. Is it particular to urban ecosystems? What is the result in a different context, for Vietnamese sylvosystems?

Figure 5: Some CES identified in the Bergeonnerie gardens by observation

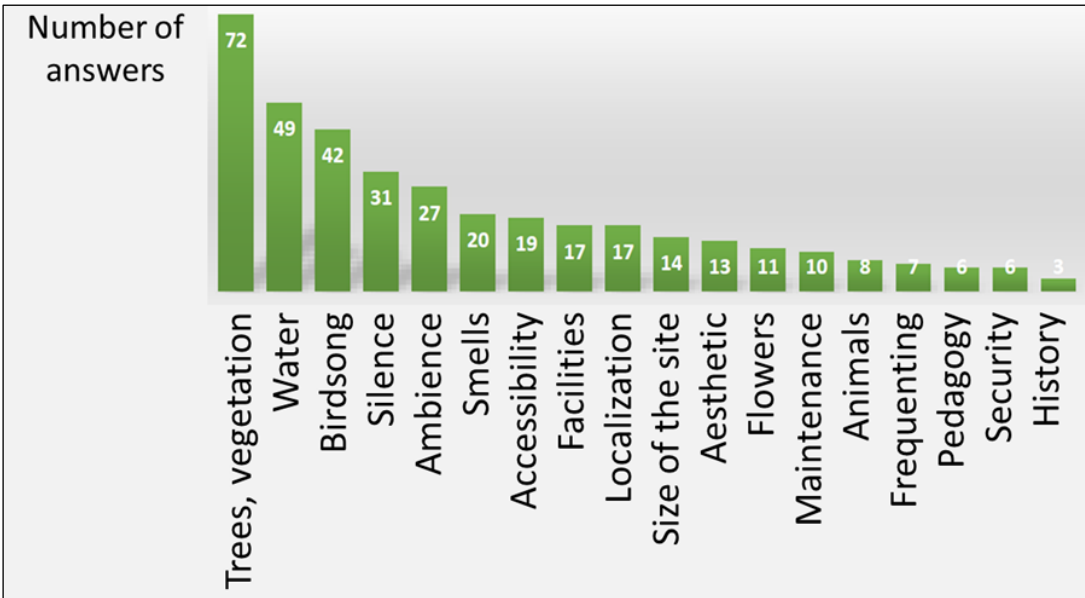
A. Teaching to the children, how to cultivate

B. Walking like in other UGS



Shoots: Robert, 2015

Figure 6: Elements contributing to the well-being felt in UGS, according to the interviewed users



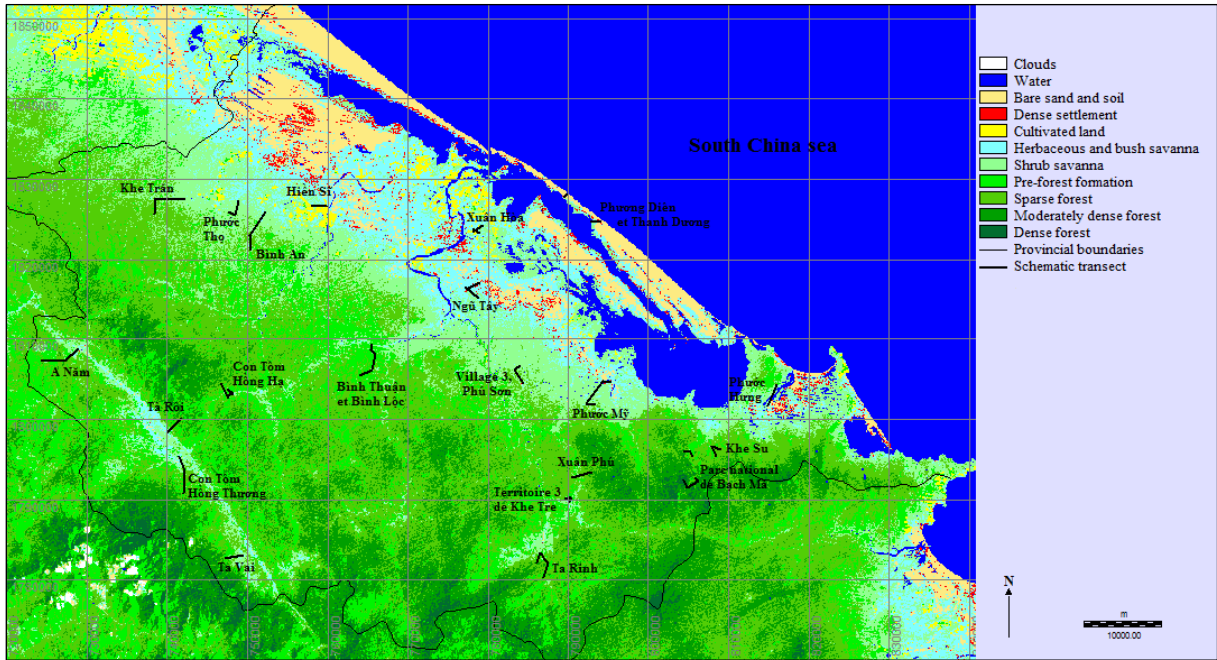
Source: Cosquer, 2014, transl.

2.2. CES offered by Vietnamese sylvosystems

From the end of the war (1975) to 2000's, Vietnamese sylvosystems declined and the Thừa Thiên Huế province was particularly concerned (fig. 7). Sylvosystems are more and more pushed back in mountains, towards higher altitudes. But some new forests appear in landscapes: plantation forests (Robert, 2011).

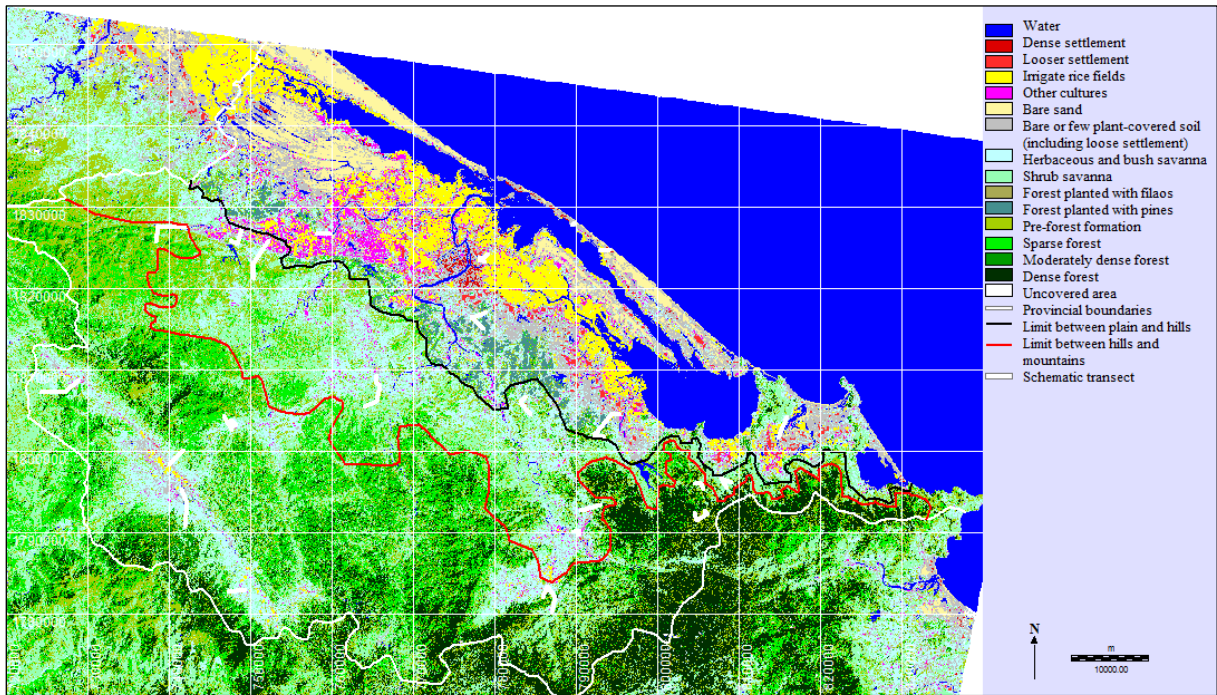
Figure 7: Forest decline in the Thừa Thiên Huế province, between 1975 and 2003

A. Land use map in 1975



Source: Robert, 2011, transl.

B. Land use map in 2003



Source: Robert, 2011, transl.

The province is inhabited by different ethnic groups. The majority one, *Kinh*, is concentrated in the plain, whereas the ethnic minorities reside only in the mountains (Robert, 2011). These ethnic groups have different perceptions of sylvosystems.

Kinh consider forests with repulsion. In the past, especially during the French colonial period, they thought that these areas were barren, infested by malaria (Gourou, 1940), fevers and “evil genius”. They also considered that the inhabitants of the forested area were “wild” peoples: they belong to ethnic minorities and had a reputation of ferocity, associated with magical power, anarchic independence and nomadism. In other words, forests were a source of disservices for *Kinh*. From 1945 to 1975, the area was affected by the war (Indochina war against French then Việt Nam war against American) and this event led to some changes. *Kinh* first showed reluctance to fight in forest (Marill, 1994). But these ecosystems became their refuge, to protect from the enemy attacks (Robert, 2011). After the war, they were thus more familiar but the economic aspects were more important than the cultural ones: forests were first regarded as source of wood and other products, in other words for their provisioning services.

In the past, the ethnic minorities of the Thừa Thiên Huế province had an opposite perception of forests from the one of *Kinh*. Indeed, they lived in osmosis with these ecosystems, which provided them all resources they needed (Gourou, 1940). Even their way of cultivation depended on the forests: they practiced shifting cultivation. The sylvosystems were thus a source of numerous provisioning services. Moreover, they also provided CES (Robert, 2017). Indeed, the ethnic minorities believe in the forest spirit and they thus give a sacred status to some forests. The choice of these ones depends on the ethnic groups:

- for *Pahy* people, the sacred forests are places to pray,
- for *Bru Van Kieu*, *Ta Oi* and *Pa Co*, they are cemeteres,
- they can also be places, where precious objects are hidden (Hyunh Thu Ba, 2003).

The beliefs thus can vary according to the ethnic groups, between the majority and the minority ones, but even between the minorities themselves. These beliefs can also change over time. For example, during the war, some new sacred forests appeared: they are the ones where *Việt Công* died (Robert, 2011). These variations lead to some difficulties to draw a map of these beliefs, which pertain to CES, from localization of ethnic groups (to be considered for landscapes mapping). No generalization was indeed possible and consequently we can't draw a map of CES provided by sylvosystems, even if we only consider sacred forests. The only solution is a complex method, consisting in drawing a map for each ethnic minority and at a given date, basing on interviews conducted in each villages of the studied area. In other words, such a map needs a systematic study in the whole studied area.

3. Discussion and conclusion

Linking landscapes and ES appears relevant, all the more for the study of cultural services. Indeed, these two concepts:

- question the interrelations between Man and Nature, the societies and their environment;

- favor interdisciplinary approach, from nature sciences to human and social sciences. The perceptions and the linked activities pertain to landscapes study – according to the interpretation of this concept we consider (see above). The study of CES offers a complementary analysis, by the answers it gives to the following questions: what do these perceptions offer in term of services to users? How does it contribute to their well-being?

But, as it is difficult to include the various assessments of landscapes, the ones from the different actors, it is also difficult to generalize and thus map CES – for urban nature as for sylvosystems.

T. Plieninger, S. Dijks, E. Oteros-Rozas and C. Bieling (2013) confirm the interest of such a study and the linked difficulties:

“Numerous studies underline the importance of immaterial benefits provided by ecosystems and especially by cultural landscapes, which are shaped by intimate human–nature interactions. However, due to methodological challenges, cultural ecosystem services are rarely fully considered in ecosystem services assessments.”

“We conclude that, despite remaining methodological challenges, cultural services mapping assessments should be pushed ahead [...]. Spatially explicit information on cultural ecosystem services that incorporates the differentiated perceptions of local populations provides a rich basis for the development of sustainable land management strategies. [...].”

Our research was conducted in two different contexts. The study of T. Plieninger, S. Dijks, E. Oteros-Rozas and C. Bieling (2013) adds another one, in German villages included in the Upper Lusatia Pond and Heath Landscapes Biosphere Reserve. It leads us to more general conclusion about generalization and mapping of CES. Whatever the studied area and the analyzed ecosystem, the assessment of CES can only be conducted at a local scale, by an analysis of the different point of views, collected by interviews. It is impossible to associate one CES to one land use category as it is impossible to reduce landscape to land use: we should consider perceptions. But these ones vary according to the actors, their culture, their ethnic belonging and even people; they change over time, even according to the context of the interviews. These variations compromise the generalization of the identified CES. They thus make complex the mapping of these CES. T. Plieninger, S. Dijks, E. Oteros-Rozas and C. Bieling (2013) speak about the richness of *“Spatially explicit information on cultural ecosystem services that incorporates the differentiated perceptions”*. But the question is how incorporating these differentiated perceptions, at a scale larger than the local one, in a way that could be easy and not too much time-consuming. What we can assert is that it can not be done by using only land use map. The generalization from the knowledge of the localization of a given land use category is not possible or it is not sufficient and leads to mistakes: a given CES can not be only associated to a given land use category. For French UGS as for Vietnamese sylvosystems, our research has to be carried on but it already reveals that the knowledge of CES is more complex and requires a more systematic research, linking CES and landscapes – in the sense we

consider here –, taking into account the perceptions of the different stakeholders. This is probably why a lot of studies are conducted at local scale.

Acknowledgements

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