

Robustness, vulnerability and adaptive capacity of long surviving traditional forestry institutions. Case study of community management in Slovakia.

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This work was supported by the European Commission within EcoFINDERS project (FP7-264465).

1. INTRODUCTION

The forestry sector has traditionally been a strong resort in most of Central European countries, as the forest covers approximately 30 – 40 % of the their territories. The management of forest resources is characterized by existence of a long forestry tradition, and dynamic evolution of the forest ownership structure originated in 17th century. These systems have been experiencing a range of disturbances, including change of political regimes, economic conditions and environmental changes that challenge their capacity to maintain sustainable output. Political and institutional changes, in particular the establishment of communist regime in 1948 followed by large nationalization of property has had a significant impact on traditional forest management practice in particular shift to state large scale and centralized forest management. Political transformation and denationalization after the fall of communism, in 90s' returned forests to original owners but the lack of proper institutions affected re-establishment of effective regimes. Political transformation and globalization increases traditional social-ecological systems' (SES) vulnerability to the emergence of new market forces. In an attempt to adapt, local communities are intensifying the use of resources; consequently, new vulnerabilities are emerging. This situation can inevitably lead towards the collapse of this traditional SES.

Our paper concentrates on the analyses of historical forest common property regime in central

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Europe – called ‘Urbars’ - that transformed into the present forest governance structure after 40 years interruption during socialism. The political transformation and changes in property rights structure has created the opportunity for local forestry communities to re-establish their traditional management practices. However in the current globalized era, the emergence of market and increased market demand for timber may affect many local communities and the institutional structure of traditional social-ecological systems (SES).

The term SES emphasizes the strong relationship between humans and the environment (Berkes and Folke 1998). Forest systems are an example of a SES composed of particular set of resources, their users, particular set of institutions, and their mutual interactions (Anderies, et al. 2004). There is abundant evidence of SES that have persisted for long time, remaining in particular configurations by adapting their institutions to natural and social disturbances (Berkes and Folke 1998), as well as to the broader economic, political and social systems in which they are located (Janssen et al. 2007). Many farmer organized systems (such as managed forests in Hatfield Forest (Rackham 1988), irrigation systems of Bali (Lansing 1991, the lobster fisheries in Maine (Acheson 2003 or dike systems in Netherlands (Kaijser 2002 are long-lived and remain robust.

At the same time, in the process of globalization, various well-adapted SESs have experienced serious challenges, collapsed or experience substantial overuse and mismanagement. Understanding and managing such complex systems are a tremendous challenge for human society and are essential for enhancing the robustness of vulnerable SES. Robustness is understood as the capacity of a system to maintain its performance when subjected to internal and external disturbances (Janssen and Anderies 2007). A SES is robust if it prevents the ecological systems upon which it relies from moving into a new domain of attraction that cannot support a human population, or that will induce a transition that causes long-term human suffering (Anderies, et al. 2004).

To study these processes, it is essential to understand how SESs become vulnerable as the context in which they operate changes in increasingly globalized world. Systems can become adjusted to some type of disturbances, and in doing so may become vulnerable to regime changes caused by many contemporary social-economical processes (Janssen et al. 2007).

This article aims to highlight the new disturbances that change the structure of traditional SES and analyze the effect that this processes have on the robustness of the system. Moreover, it

aims to offer some recommendations to enhance the robustness of the system to be able to cope with new disturbances. To address this, we reviewed academic literature on several traditional SESs threatened by new disturbances in their environment. We also interviewed a number of local forestry communities in east part of Slovakia. To analyze the changes occurring in our study, we used the conceptual framework proposed by Anderies et al. (2004) (Figure 1). This framework emphasizes the interrelationship between four main components of SES (resource, resource users, public infrastructure providers and public infrastructures) that are especially important with regard to robustness. Resource users and public infrastructure providers are human-based. Public infrastructure includes physical infrastructures and social capital (i.e., institutional rules). The links between the components may challenge the robustness of the overall SES.

This research shows how globalization and emergence of market affects the robustness of a SES. In an attempt to adapt, some local foresters have intensified the use of this resource. As a result, new vulnerabilities are emerging. This situation can lead toward the inevitable collapse of this traditional SES. However flexibility of rules, local knowledge and experience creates conditions for renewal and increases ability for adaptation to external disturbances.

The structure of this paper is as follows: The second session highlights the main factors enhancing the vulnerabilities of SES. The third session presents the case study and analyzes the driving forces that enhance the vulnerabilities of the local SES and its effects on its structure and robustness. The session number four discusses the possible consequences of changes in disturbance for the traditional SES and offers some recommendations to enhance the robustness of traditional SES. The last session draws some general conclusions.

2. UNDERSTANDING SOCIO-ECOLOGICAL SYSTEM

The framework highlights the main vulnerabilities of SES to various disturbances that are especially important with regard to robustness. The vulnerabilities of SES to the external disturbances derive from the internal components of the systems (public infrastructure providers, institutions and resource characteristics), their mutual interaction and changes in larger-scale SESs.

Although SESs can function for long periods of time, they are not immune to new disturbances. When SESs adapt themselves to specific institutional patterns, they become

vulnerable to changes in physical or political accessibility. An increasing number of SESs are experiencing the challenge of changes of access by physical or institutional barriers often imposed from the top down (e.g., construction of a new roads) (Young 1994; Agrawal 2001; Laurence et al. 2009). Access to global markets can lead some SES to transform, but they can lose their local adaptive capacity as a result. For example, in the medieval open-field system in England, the peasant had private property rights to the grain they grew on their individual strips. However, during particular seasons, peasants were obligated to open the land to all the landowners in a particular village so that they could all graze their sheep. Due to high transportation costs, local communities needed to produce both meat and grain in a small local area. When the transportation improved and communities had access to markets in grain and meat, no need existed to continue this complicated adaptation (Smith 2000).

If physical accessibility improves, new economic actors obtain easy access and can exploit and commercialize the harvesting of natural resources. A top-down intervention of institutional or physical barriers may affect accessibility more abruptly and the SES may not be able to adapt rapidly enough.

Especially in transition countries of Central and Eastern Europe or Asia, the market introduction is also favored by changes in the socio-political context. In some cases, and frequently in developing economies, the national or international government intervenes in small-scale SESs in order to enhance introduction of market and improve economic situation of the State and local actors. An interesting example of such a top-down intervention is the nested irrigation system in Taiwan (Levine 1977; Moore 1989; Lam 2001) or in Bali (Lansing 1991). In other cases, an institutional change or political reorganization of socialistic economies has taken place. For example, the overexploitation of fisheries on Ohird Lake in South Albania. The top-down implementation of devolution policies and collective action management failed, due to the ignorance of already existing local rules and power relationships (Rama and Theesfeld 2011).

New socio-political context and increased demand for natural resources make system more valuable to market. Some examples include the shrimp aquaculture practices in south Asia, which have increased in response to the Japanese market (Sathirathai and Barbier 2001; Barbier and Cox 2002), or the enormous extension of forest that is disappearing in south Asia and south America as a result of new soybean and oil palm plantations (Sandker et al. 2007; McCarthy and Zahari 2010).

In general, the introduction of market depends on the interest in the resource, as well as the physical, institutional and/or socio-political difficulties in access. That is, the greater the interest in the resource and/or accessibility, the more vulnerable the SES is to the introduction of new market. Finally, the probability that market affect a new area is influenced by institutional structure and clearly defined existing national and local rules.

If the SES has clearly defined enforceable boundary rules, it is easier to identify who should receive benefits and pay the cost. If boundaries are not well defined, resource users are less willing to trust one another and the public infrastructure providers (Anderies et al. 2004). The harvesting rights of local communities, monitoring, graduated sanctioning and conflict resolutions mechanisms are some essential institutions to control market influence on user communities and thus can be thought of as a feedback control for resource use (Ostrom 1990; Anderies et al. 2004).

3. CASE STUDY: FOREST MANAGEMENT IN SLOVAKIA

3.1 Broader socio-economic content of forestry in Slovakia

Forestry has traditionally been a strong resort in most of CEE countries. This part of Europe still harbours large and relatively wild forest ecosystems. The area of the forest in Slovakia is approximately 2 million hectares (ha), which represent about 40% of the total land area. Of this, 49.6% (959,000 ha) is classified as primary forest, the most biodiverse and carbon-dense form of forest. Slovak forests are known for having a rich diversity of tree species: dominated by beech (31%), followed by spruce (26%) and oak (13%) (Green report 2009). The state owns over 41% of the country's forests, and manages more than 55% of total forest area. The rest of the forest is owned by different non-state forest owners, including individuals, municipalities, shared ownership communities and the church.

Historical forest ownership pattern in Central Eastern Europe constitutes mainly of Austrian and Hungarian aristocracy, the Catholic Church and the monarch. The long history of Austro-Hungarian forest management dates back to the 16th century. In that time forestry supplied traditional mining activities. Because of the negative impacts of such activities on the forest quality, legal measures to regulate and protect the forests were issued and implemented. In 1852 (in Hungarian part from 1857), use rights started to be systematically regulated by the

Austrian Forest Law (No. 250). It regulated harvesting and established the state control over forests. In 1879, first state forest management plans came into force (Řezáč, 2001).

The most significant non-state form of forest ownership was a historical land co-ownership regime known as 'urbar'. It was a form of self-governed land co-ownership regime mainly of forested land and pastures. They were created in 18th century for the use of feudalists' pastures and forests. The name originally referred to a register of serfs' properties and their respective duties towards a feudal lord (Štefanovič 1999). Gradually, serfs were freed from their obligations towards landlords. However, they continued to use pastures and forests and they paid a rent to the landlord in return. After the abolition of serfdom in 1848 those pastures and forests were transferred to them in the form of common property (Štefanovič, 1999).

3.2 Traditional forest management system

In this historical form of forest ownership (Figure 2), the resource users were co-owners of the forest (resource) usually from one village. Property in the urbar is inherited from parents to children in equal share. To undertake managerial responsibilities, community rules for harvesting, replanting and self-management were developed over time. Each owner had a duty to participate in the management, taking the size of the share into the account as well as having the right to collect an annual benefit from the land. Those conditions created a platform for the evolution of informal norms and habits respecting the economic interests of shareholders, social equity and ecosystem dynamics.

The most significant formal forest act during Austro-Hungarian Empire was forest degree of Maria Teresa. The act was issued in 1767 to manage wood as strategic resource for mining industry, but also protect forest from overexploitation by overgrazing, illegal timber and inappropriate land use changes (Nozicka 1956). Translated into the Hungarian and Slovak this documented served as management guidelines for forest industry since 1770 and was adopted also by urbars. The guidelines contained 55 management rules for harvesting and forest revitalisation designed to maintain forest quantity and quality in long term. These includes age of the trees permitted for timber, harvesting techniques, harvesting (rotation) and forest revitalisation calendars, measures to protect wood from mechanical damage and soil against erosion, duty of registration of type and quantity of timber. Degree contains also regulations for inspections, planting, guidelines for flood protection, regulation of housing and fire

protection. Division of the responsibilities and rights was also regulated. Each co-owner of urbar had a duty to participate in the management according to the size of the shares and having the right to collect an annual benefit from the land. Appropriation and provision rules have been derived from historical practices, which to the large extent still reflect local circumstances.

Long term planning and direct connection to the resource enabled evolution of sustainable forest management. The fact that urbars boundaries do not match with ecosystem boundaries provide positive incentive for cooperation among urbars and make their relations inter-dependent. Number of growing examples well documents this process, e.g. cooperation on wood transfer and road maintenance (Kluvankova-Oravska 2010).

Annual profit was distributed to members according to their shares or redeemed in firewood. This practice is still used by elder people in villages. As the amount of land owned per owner was usually very small, the individual earnings were rather minor. Share in the urbar could be sold only with the approval of the assembly. Priority of existing members is legally binding.

3.2 Driving forces that enhance the vulnerabilities of the local SES

This case study represents a SES that has traditionally used a very valuable natural resource. Changes in the political and socio-economic conditions which this resource operate, along with market pressures (new external disturbances) and alteration of boundary rules of the common resource, have change the structure of traditional SES and affected its robustness.

Forest is valuable and the most vulnerable natural resource in many rural areas of Central - Eastern Europe. In our study area, abundant, cheap, and sometimes-unprotected forest being available, cheap land have all attracted new market. One of the vulnerabilities of this SES is that an effective institutional system capable to protect the whole ecological system is lacking. The Ministry of Agriculture of the Slovak Republic (MA SR) is the supreme national authority on forests and game management (SAFGM). Practical aspects of state supervision are covered through a network of regional and district forest offices. The SAFGM duties at the executive level are secured by the MA SR Forestry Department through its Forest Management Unit, Unit of State Administration on Forests and Game Management Sub-unit. MA SR remains to be the main decision-making body at the central level, taking responsibilities for forest planning and zoning of every forest ownership type. Slovak forests

are classified into three categories as commercial, special and nature protected (Act no. 326/2005 on Forests). However several provisions of forest and biodiversity protection legislation do not match. Contradicting are definitions of forest categories and rules that applies for the management in protected forests. This creates numerous conflicts over the use of the forest and challenges the right of urbars to devise their institutions often resulting in overexploitation or even in open access.

After the Second World War, new land reform was undertaken in 1945 and 1948 respectively when most forests remained in non-state hands were confiscated by the socialist regime (Act No. 46/1948). This process affected all individual owners as well as various non-state entities, such as municipal forests or co-common property regimes. The nationalization of forests was completed in 1958 (UHUL, 2009). In the early 90's as a result of democratization and political transformations, the land was restored by restitution and privatization to the previous owners. Re-nationalization (private property renewal) was completed after the separation of Czechoslovakia into Czech Republic and Slovak Republic in 1993, transforming more than 50% of Slovak forests back into the hand of non-state owners. During 40 years of socialism the study area has been politically and economically isolated from market forces. However, the central planning, the transition to a market economy and opened boundaries for international economic actors, have presented a substantial challenge to the forest commons. The new market opportunities call for more intense harvesting to generate better profit.

3.5 Changes in the structure and robustness of the SES

The institutional and political changes in Slovakia have led to a very different configuration of the traditional SES (Figure 3). The long existence and tradition of urbars was interrupted during communism, when land was in the hands of the state. However, in early 90's urbars was re-established in the process of land restitution by Act no. 181/1995 on Land Associations. More than 40 years of regime disconnection and land nationalization in 1948 has resulted in significant fragmentation as it increased the numbers of resource users and reduced the sizes of individual shares to sometimes less than 1 ha. Although currently the law regulates the size of one share to 2 ha (Štefanovič 1999) and stabilize the numbers of co-owners, but comparing to early 40's the number of co-owners in one urbar is sometimes more than ten times higher. Today, only small part of members takes part on the management of the forest due to the

diversification of economic activities, change in the life style, in particularly for those members who change their residency.

However, due to residency changes and lack of interest in management activities not all members can take part on collective choice arrangements. The main decision-making body is an assembly of owners (providers), which takes place once a year, and adopts an annual harvesting strategy and approves budget. It also delegates all day-to-day decisions to the economic committee, consisting of elected and professional members. The important issues (i.e., expenditures on forests maintenance, earnings, etc.) are discussed during general assemblies, and they make decisions collectively (everybody has a right to vote according to the size of the share). Sometimes, lack of common understanding and weak communication within an enlarged and diversified group changes the original self-governance conditions and leads to the adoption of less flexible management activities. It can affect trust among members as those who are local may want to influence decision-making more than externals (interview with urbar leaders). Currently, the infrastructure providers are not only urbars assemblies but also regional and district forest offices, plus Forestry Department of MA SR and its Forest Management Unit, Unit of State Administration on Forests. Moreover for forestland situated in protected areas it is also the Ministry of Environment and Administration of National parks or other types of protected areas.

Since the very beginning of the forest ownership, the forests have only served their owners as an additional source of living. Due to their small size, they have learnt how to sustain forest in the long term and thus, they contribute to the sustainable use of forests (interview with urbar leaders). Traditionally, urbars have adapted their rules and management practices to external variability. Each subject has a certain flexibility to decide on the harvesting and replanting strategy for the following year. Such system enables flexibility of decisions to reflect external social and natural shocks for example timber price decline, wind blow damaging forest and others. This SES has been adapted to deal with variable environmental and economic conditions.

Another problematic issue of the present is that the 40 years of interruption resulted in an erosion of local knowledge and loosening roots in the community due to resettlement to large cities. Resulting from technological modernization and lost connections to forest resource during state property regime (1945-1990) number of original forest management practices do not exists anymore although they contributed to the sustainable harvesting such as seasonal

harvesting calendar (interviews with urbar leaders). Particularly younger generation may see the co-ownership of forestland, as an opportunity for increasing profit generation and due to lack of information about local conditions tends to use intensive and not always suitable harvesting practices.

Moreover, due to lack of knowledge about local conditions of the forest resource, the co-owners of urbars sometimes use harvesting practices that have negative effect on surrounding environment and neighbouring urbars. Certain types of harvesting practices can have negative influence on the water regulation and prevention against floods. The new intensive harvesting practices affect the resource dynamics vastly (link 5). Nowadays, the unpredictability and uncertainty of water precipitation and sudden storm rainfall have increased. The probability of floods in the area depends not only on the amount of rain precipitation but also on the ability of the forest to absorb and retain the water. Thus, new intense harvesting practices affect not only the ecosystem dynamics but also the relationship between neighbouring urbars.

Today a significant proportion of urbars' land is part of nature-protected regimes (national protected areas or EU Habitat Directive protected areas NATURA 2000). The national park administrations are responsible for nature conservation in the entire area of national protected areas, but the forests (and also urbars) are under the control of a state company subordinated to the Ministry of Agriculture. Additionally several provisions of forest and biodiversity protection legislation do not match. Contradicting are definitions of forest categories and rules that applies for the management in protected forests. This create numerous conflicts over the use of the forest (interview with the leader) and challenge the right of urbars to devise their institutions not rarely resulting in overexploitation or even in open access.

Currently urbars operates on ten-year programmes designed and controlled by the state forest authority. Timber, replanting and other activities are planned for this period and each subject has a certain flexibility to decide on the strategy for each year. This SES was robust in terms of wood harvesting and dealing with variable weather conditions. Number of urbars uses also self-monitoring mechanism to control harvesting process and internal sanction system mainly in the form of gradual exclusion of rules violators from group benefits. External sanctions are imposed by governmental authorities, in particular forest and nature conservation inspection. However due to several regime changes (new external disturbances) this SES has become

more vulnerable to new political and economic processes. More evidence will be provided and discusses in next session of this paper.

4. ENHANCING THE ROBUSTNESS

In the current complex and globalized era, protecting and preventing the degradation of a traditional SES means, among other things, to find mechanisms that enhance its robustness and reduce its vulnerabilities to external disturbances such emerging access to global markets. Access to global markets has led some SESs to change its structure, but they have lost their local adaptive capacity as a result (Janssen et al. 2007). Vulnerable natural resource systems may be destroyed, the historical and long surviving livelihoods of social systems and local communities may disappear and, subsequently, all this may lead to the collapse of an entire traditional SES. Local communities may become adapted to the emergence of market, but on the other hand can become extremely vulnerable to other type of disturbances. For instance, for SESs affected by unexpected extreme weather conditions, the benefits of structural transformation do not (yet) outweigh the costs of losing adaptive capacity (Janssen et al. 2007). When local communities attempt to adapt to global market, they may intensify the exploitation of their own resources, and makes them more vulnerable in the long term.

In this process, local knowledge, institutions' capacity to respond and flexibility of local rules are essential in order to avoid the SES from collapsing. In our case, some local rules survived thanks to the transfer between generations and today such knowledge carriers become elected leaders. Those conditions created a platform for the evolution of informal norms and habits respecting not only the economic interests of shareholders but also social equity and ecosystem dynamics (Slavikova et al. 2010). Flexibility, self-governance and local experience create conditions for renewal of long-lasting institutions that have demonstrated their ability of adaptation to external factors (Šulek 2007). In comparison, the big private or state owners have not developed such flexible rules and management plans. Moreover, lack of understanding of the ecosystem dynamics may lead to late detection of negative consequences of overharvesting until it is too late as ecological or local social systems have (almost) collapsed. Although the timber overharvesting can be almost seen instantly, the cumulative

effect and consequences may appear with delay. For instance, deforestation has had long term negative effect on soil erosion, landslides and flood protection in many developing countries. Local users' knowledge of the ecological system and tight connection with the resource, means they are capable of rapidly detecting symptoms of degradation and can, therefore, start action to prevent the SES, or adapt it, from degradation. Moreover it increases the ability of the system to recognize and buffer the negative influences of cumulative effect of disturbances and prevent the system from collapsing. For this reason preservation of traditional local knowledge and flexible rules is one of the conditions for enhancing the robustness of SES.

Better information management, transparent decision-making and rules for co-operation are also critical to ensuring the robustness of the system more in the face of disturbances. Communicating, and collaborating through adaptive co-management has been found to be essential practices for local communities to rapidly respond, adapt and handle any eventual consequences of disturbances (Olsson et al. 2004; Armitage et al. 2009). In our case study the fact that urbars boundaries do not match with ecosystem boundaries provide positive incentive for cooperation among urbars and make their relations inter-dependent. Several legal measures exist to prevent the exploitation of the local resource by establishing property rights, protected areas and technological controls (prohibition of certain techniques). On the other hand payments schemes are often implemented in order to compensate local communities for the restriction on their activities. As a significant proportion of urbar land is situated in high elevation with difficult access and in most cases is part of nature protection regime, they are receiving small compensations for the restriction on their activities. While many private owners complain about the compensations being inadequate, the extreme climatic conditions would not allow for higher income from timber and thus some urbars "voluntarily" participate in the environmental compensation schemes (interview with urbar leader). Such situation leads to the adaptive process and shift of management strategy from intense harvesting towards more sustainable management.

5. CONCLUSIONS

Recently more and more natural resources and local communities continue to be vulnerable to some internal and external disturbances. Structural changes (e.g. intrusion of new resource users, changes in institutional settings) may seriously affect the capacity of the system to adapt to external disturbances. This research demonstrates how globalization and market forces affect the robustness of traditional long lasting SES. The research of traditional forest regime reveals how the structural and institutional changes seriously affect the quality of a given natural resource and makes a SES profoundly vulnerable. In an attempt to adapt, local actors have intensified the use of this resource.

This situation may lead towards the collapse of this traditional SES and, thus, to the inevitable loss of long lasting historical regime and a unique example of the sustainable use of a natural resource. Despite several problematic issues discussed above this study reveals that self-governance, local knowledge and flexible rules, where identified as perspective attributes of resource regime to cope with unpredictable disturbances and complexity of global changes. Urbars' can be seen as long surviving institutions for sustainable forest management under the market and globalization.

The framework of Anderies, et al. (2004), which we have employed in this article, has proven adequate to analyze the changes in the structure and robustness of a SES. Future research and the use of multiple methods may provide in-depth understanding of the factors that enhance the robustness of this vulnerable SES. Although there is always a need for a case specific analysis of the local situation, we offer a series of institutional measures to help adapt to disturbances or, at least, slow down its negative effect.

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Annex

Figures 1, 2 and 3: Application of the conceptual social-ecological systems model (Anderies et al. 2004) to the traditional forestry system: 1) Robustness framework, 2) the traditional system before the emergence of market, 3) the current situation after the emergence of market and institutional change

Figure 1.

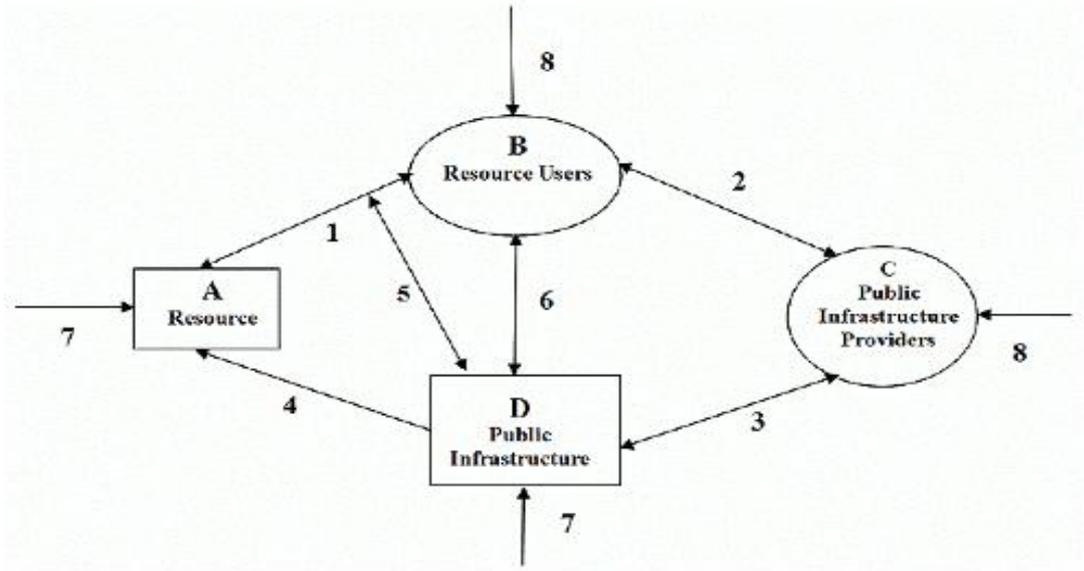


Figure 2.

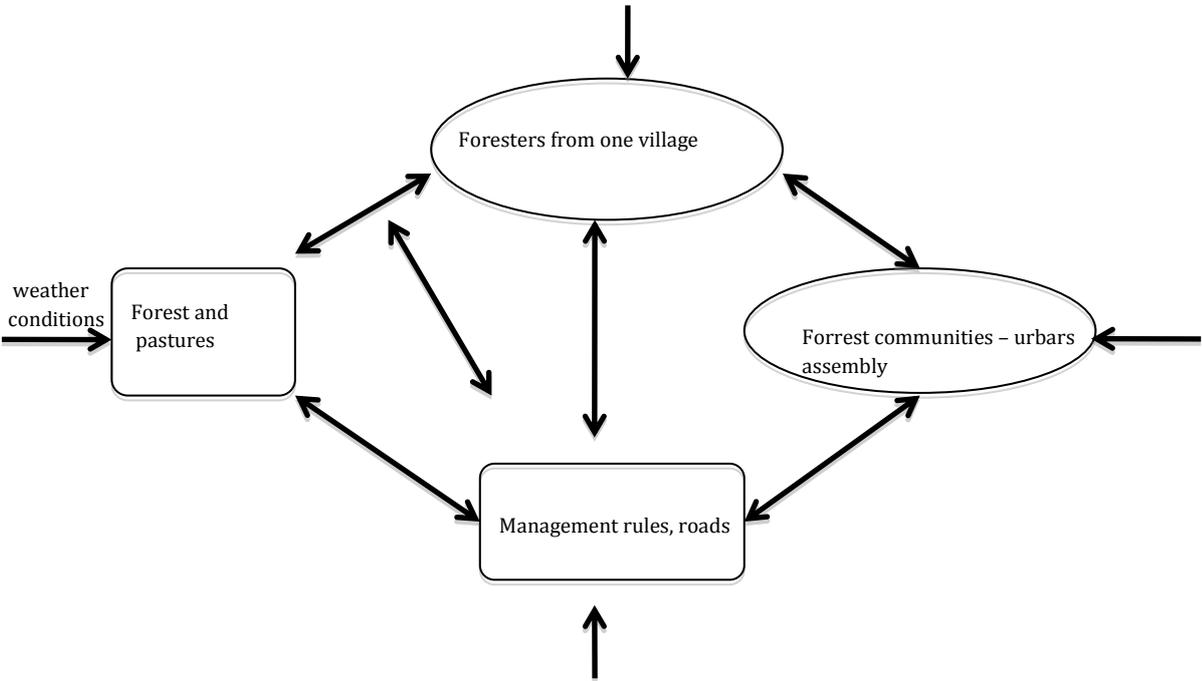


Figure 3.

