

The root causes of the issues of social-ecological systems in Central Fragile Zone of Sri Lanka

A Political Ecological Analysis, the Case from Sabaragamuwa Province

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Abstract— this article reveals the root causes of the issues of social-ecological systems in Central Fragile Zone of Sri Lanka. Understanding of the causes should use to develop a sustainable development framework for environmentally sensitive areas, three villages of in Sabaragamuwa Province (SP), Sri Lanka.

By examining relationship between social systems and ecological systems that existed in the study area for the last 100 years, the existing social-ecological system in environmental sensitive areas of SP in Sri Lanka has been conceptualized. The study clarifies the issues, which are being faced by the permanent settlers in the region and attempts to forecast the situation that may occur in the immediate future, finally suggests the possible solutions for the issues. Mainly this study depends on political ecological perspective to understand the exiting political ecological problems in the communities, two main theses of political ecology, called the degradation and marginalization thesis and the conservation and control thesis, applied. This study depends on both secondary and primary data with qualitative approach.

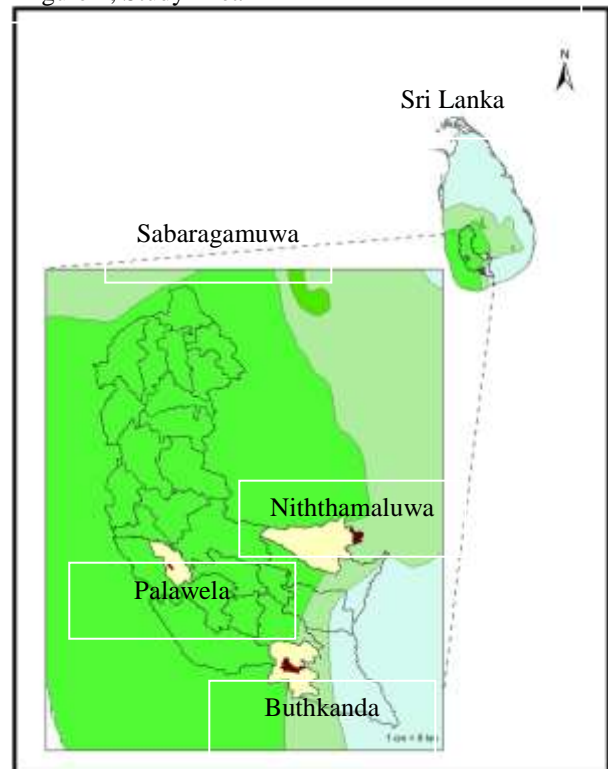
Keywords— *ecological Systems, Fragile zone, Sri Lanka, Political Ecology, Sabaragamuwa*

Introduction

By examining relationship between social systems and ecological systems that existed in the study area (see figure 1), three villages in Sabaragamuwa Province, Sri Lanka, namely, Niththamaluwa (6.43' 28" N, 80.49' 58" E) GN in Imbulpe Divisional Secretariat Division (DSD), Palawela (6.38' 53" N, 80.21' 11" E) GN in Elapatha DSD, and Buthkanda (6.22' 38" N, 80.40' 32" E) GN in Kolonna DSD, for the last 100 sensitive areas of Sabaragamuwa Province in Sri Lanka has been conceptualized. Many people who live in case study villages within the environmentally Fragile area have revealed the complexities of social-ecological relationships that they experienced. Sometimes such understandings and relationships differ from mainstream environmentalism or sustainable development discourse: they are generally couched in terms of defending not only particular environments, but also the lives and livelihoods that those environments could sustain. For people in the region who derive their livelihood from the biophysical environment such as soil, forests, fields, and waters around them, sustainability is intimately related to rights of communal ownership, collectively sharing indigenous knowledge, cultural economy, religious rituals, and freedom while the externally imposed program seek to promote visions alien to them which impose how to conserve or develop the environments they depend upon.

The relationship between social and ecological systems is conceptualized in Figure 2. The development of human-wellbeing is a combined result of the interaction of these two systems. All the system is open, and ecological system supplies all the natural recourses, except solar energy for social system. To fulfil the needs and wants of the human beings, individually or/and as communities or social system, the resources should transform to the consumables. In this process, technology is more significant. Therefore, the level of human wellbeing of a social system depends on the level of technology that they achieved. The systematic relationship among social system, ecological system and technology make social-ecological system/s. All of these factors and processes in a social-ecological system changes through time and space and diversify the social-ecological system/s. According to thermodynamic theory, these changes make novelty in the system continuously. This concept applies to all scales of social-ecological systems, from the entire earth to a village. In this case, there are many sub systems interacting together within a single social ecological-system. This particular perspective allows me to analyse the history and current situation of my case study sites and summarize the transformation processes of these particular locations in SP.

Figure 1; Study Area

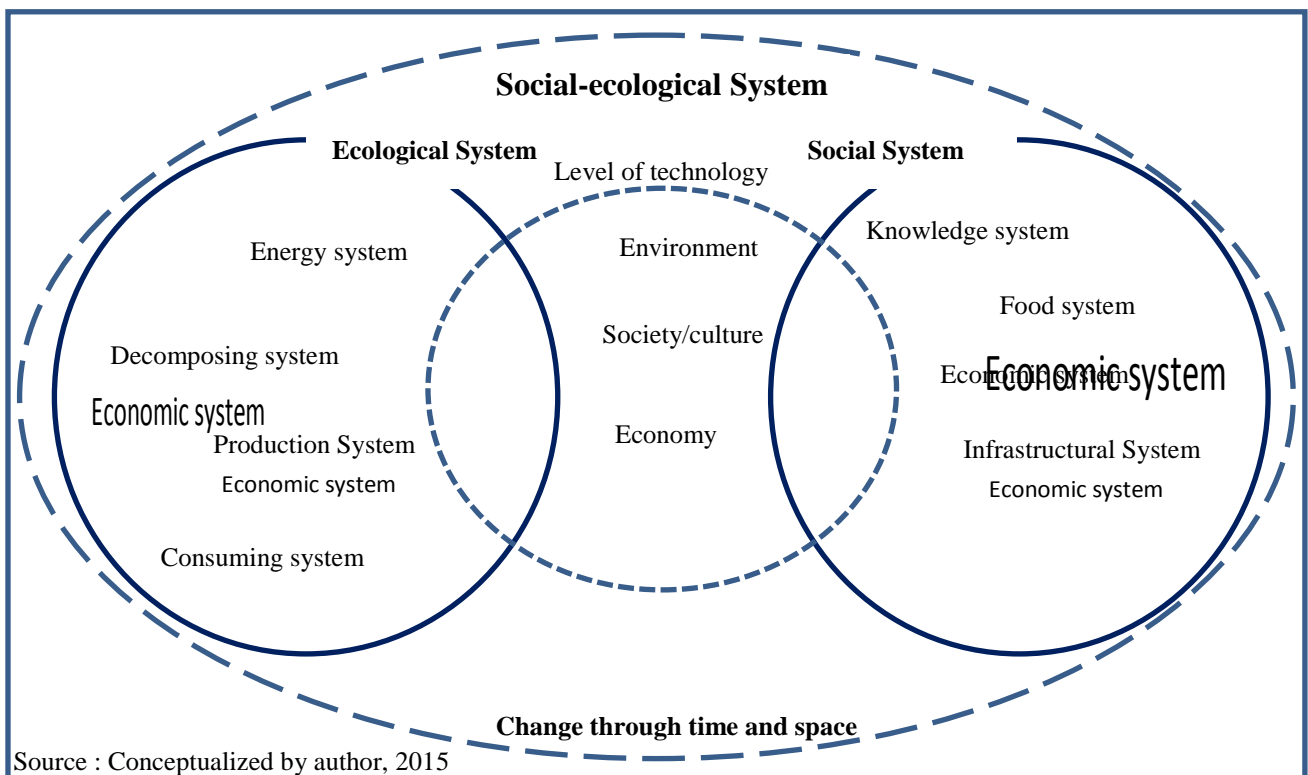


Within the last 100 years, these three social-ecological systems have been transformed in many ways. By analysing this process of transformation in these social-ecological systems, I hypothesize a sustainable development process, presented in Figure 2. This diagram discusses the process of sustainable development for an existing social-ecological system. Any kind of social-ecological system at any level, village level to global, is diversified by the drivers, which drive the factors of social-ecological system, such as socio-economic conditions, biophysical environment, political systems and its nature, technology, culture, traditions, land use and other development strategies and policies. Internal pressures which generate within the social-ecological system, and external pressures which generate outside, from local to global level, of the social-ecological system, influence to the drivers in many ways due to many reasons. The two main factors, biophysical and human, respond to pressures, both internal and external. For example, inappropriate land-use patterns can be increase soil erosion in the system and it leads to low productivity of agriculture. This causes to increase poverty or to make any other results such as underemployment, unemployment, out migration etc .

Changes or transformations in surrounding social-ecological systems can create risk, stress or opportunities for settlers. For an example, the water volume of a tributary or a river can vary by the changes in the catchment area and changes in water volume. If water volume increases, it will cause an increase in flooding in other areas, creating risk and stress to downstream social-ecological systems, or perhaps it will be an opportunity to increase irrigation for other social-ecological systems. If water volume is reduced by diversion or other water-mining activities, it will cause risk or stress to the agricultural system of affected social-ecological systems.

As explained above, risks, stresses, or opportunities made by biophysical and human factors are managed by the drivers produced through human knowledge such as technology, culture (caste, religion, gender, traditions), and economy. Any changes make within or outside the social-ecological system, the responses also make it for surviving. For an example, once, human being can change something in the biophysical environment for their wellbeing; the environment

Figure 2; the system of Human Development in Social-Ecological System of Study Sites



responds for those changes for its surviving. Sometimes, this environmental response should or should not be threatened to the social system. Consequently these responses of the both would create the equilibrium of social-ecological system social and ecological systems. In my case studies, inappropriate lands use pattern have made in biophysical environment within and surrounding areas of the study areas and under the static equilibrium, social-ecological systems can respond to risks, stresses, or opportunities in three ways: absorption, transformation, or restoration. In this equilibrium, a social-ecological system is in a defensive position and leads to stagnation or backwardness in human wellbeing. As explained in the theoretical framework, Elinor Ostrom (2009; 419-422) also says that these backward social-ecological environment responded with the seasonal droughts, floods, landslides, thunderbolts, high speedy winds, animal invasion etc. with all these responses, these social-ecological systems are made their equilibrium by two different ways. The consequences of human decisions produce two types of results in a social-ecological system: static or dynamic equilibrium. Consequently the social ecological systems should change into dynamic equilibrium. Otherwise, they might be stagnant for a long time. I argue that the case study sites are not in this equilibrium, rather they have been transforming towards dynamic equilibrium.

I argue that the study sites are not environmentally “fragile”, with very few exceptions, but are, rather, “environmentally sensitive”. This is an important distinction because these social-ecological systems are able to resilient and there is high probability to response with sustainable policy implications towards sustainable equilibrium for the social-ecological system.

Contemporary trends of the study sites

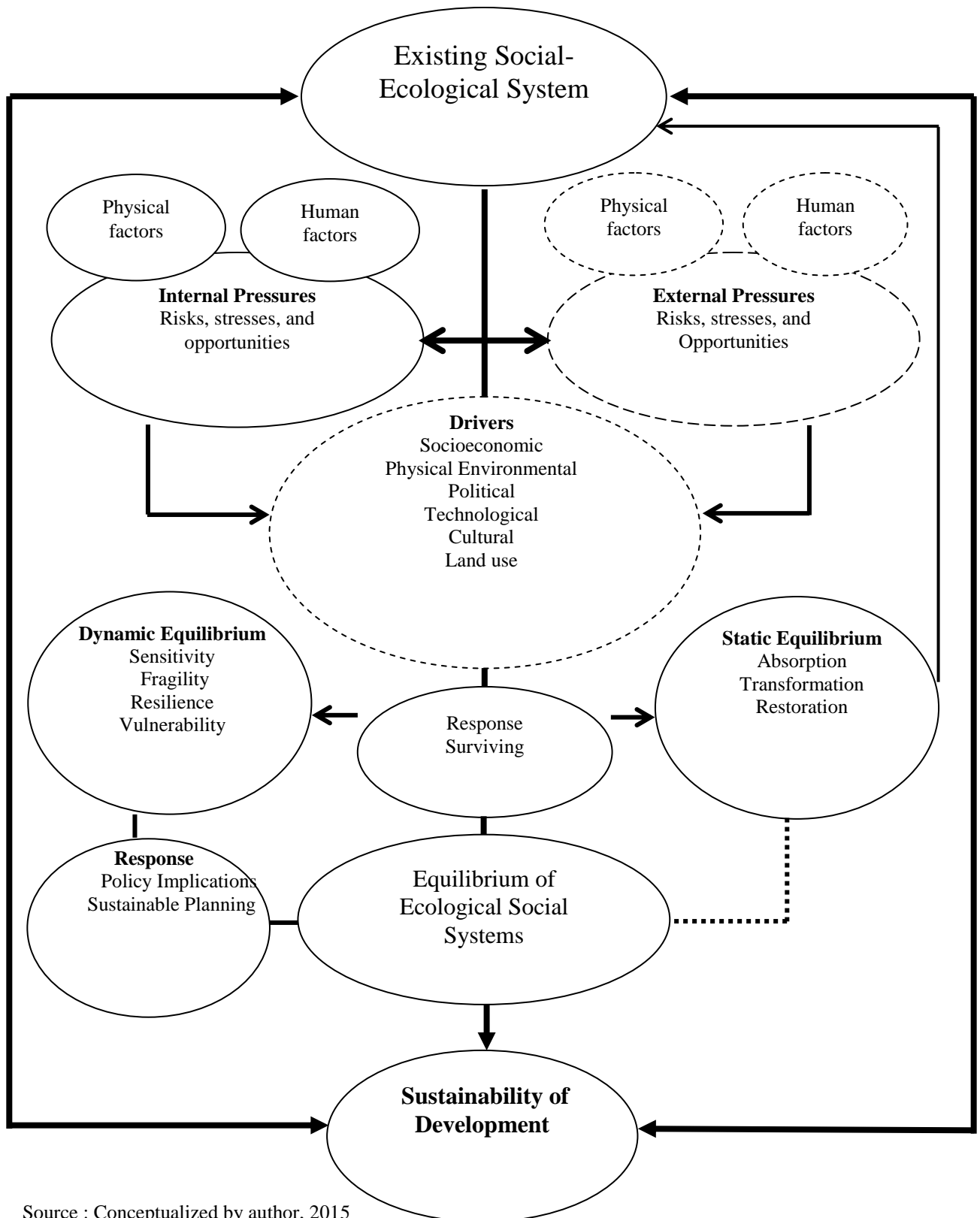
There are many trends and common themes in the study sites, and these are synthesized in Figure 4. Some trends are more critical and some are more vibrant. Some of these trends are more positive and some are more negative for the sustainability of social-ecological systems. Some trends create more opportunities and some trends create vulnerabilities. For example, population growth of all three study areas, Niththamaluwa, Buthkanda, and Palawela, has reached replacement level. With few exceptions, all families have two children. Population growth is less than 1% in all three sites. As explained earlier,

population aging is common in three villages. This is generally viewed as a good Development indicator to measure human wellbeing in a community or a nation. However, in these village areas, this is a result of land ownership. The parents and grandparents of the young generation live on the same piece of land. The majority of the land in the study sites is owned by grandparents. Youth or their parents and parents’ siblings have been fighting for the same piece of land. Well-educated youth tend to migrate away from the village in response to land ownership issues and perceived opportunities elsewhere. Therefore the aging population does not simply represent an improvement in human well-being based on lower birth and death rates, but rather a complex land tenure system that is driving young people out of the village As explained in Figure 3, one of the major critical issues of the study sites is lack of land for agriculture. Agriculture is the main economic activity of the villages. Therefore, land and water are the main base resources in all of the study sites. Reduction in land for agriculture is one of the main issues.

As shown in Figure 4 some of the agricultural lands are underutilized or unutilized by peasants. There are many causes for this aging population, land ownership issues, lack of labour, caste issues, lack of irrigation water, fragmentation of land for family members, and lands allocated for building houses for newlyweds. Besides these internal reasons, some of the village land has been accumulated by wealthy outsiders. Some of the poor villagers sell rent or lease their land for financial crises, particularly medical ones, because they do not have good insurance coverage. Using these opportunities, outsiders grab those lands. Laws prevent the new generation from encroaching upon adjoining government unutilized land or forest land, for cultivation. The ultimate result of all of these factors is that the man-land ratios of the villages have increased about 50 times during the last 100 years.

Natural resources of the study sites are depleting rapidly. Specially, in Niththamaluwa, they do not have gems furthermore. Palawela will also be lost their gem pits in immediate future because it has limited to very few lands in the village. As explained in several times in this chapter, natural resources like wind and water have been becoming natural disasters. Flood, drought, speedy wind is some of the example. Soil fertility is also reducing due to high rate of soil erosion, and soil layer is being poisoned by using the high amount of agrochemicals. This will not only support to reduce the life expectations of the villagers but also the other

Figure 3, Sustainable development process of social-ecological systems in study sites



Source : Conceptualized by author, 2015

people of the country because they eat the vegetable which are produced in the villages.

Biodiversity is highly threatened in the surrounding areas of these social-ecological systems and this situation has created the animal invasion to the villages. Due to deforestation and inappropriate afforestation, some of the animals who explained above have invaded the village home gardens and those gardens and the crops cultivation has become a new home for wild animals. This is one of the causes for reducing people's income and the crop diversification because farmers has already stopped the cultivating the crops which are destroyed by the wild animals.

As explained under the three study sites, the social harmony is also breaking down due to completion for resources and the poverty. The traditional or indigenous knowledge is losing and raising money minded younger generations who do not have concern about the environmental sustainability. Finally the majority of the trends which are mentioned in figure 3 have been threatening the sustainability of these social-ecological systems since many decades.

Figure 5 illustrates causal relationships and interdependencies of the root causes in the study sites. In the following sections, I will focus my analysis on issues that are common to the study sites, are critical concerns, and are good illustrations of the applicability

of my proposed model for sustainable development. These issues are: Land Use, Land Scarcity, Formal Education, Environmental Understanding and Animal Invasions.

Issues of Land Use Pattern

The first part of this chapter elucidated specific temporal and spatial changes in land use patterns in the study sites. Land use in Sabaragamuwa has vertical zonation. Figure 5 illustrates this altitudinal pattern. Forest and large scale tea estates are the main land use in the highest part of the mountains. The major land use in the 2nd land use zone is large scale tea estates, maintained by private companies, and protected, natural tropical rain forest. The tea estates in Zones 1 and 2 were introduced by British companies in the colonial period. After independence, the ownership and management of these estates changed several times. During the period of 1972 -1977, all of these estates, including rubber estates in the 3rd land use zone, were acquired by the government of Sri Lanka, and after 1977 all of these estates were privatized again. Accordingly, these estates have been managed by the private sector for more than 150 years.

The forest plantations in Zones 2 and 3 were introduced by the Forest Department of Sri Lanka during 1972 -1977. Varieties of pines and acacias are the main trees in these forest plantations. These forest plantations have caused many problems in the

Figure 4; Trends of Social ecological System in Sabaragamuwa Province

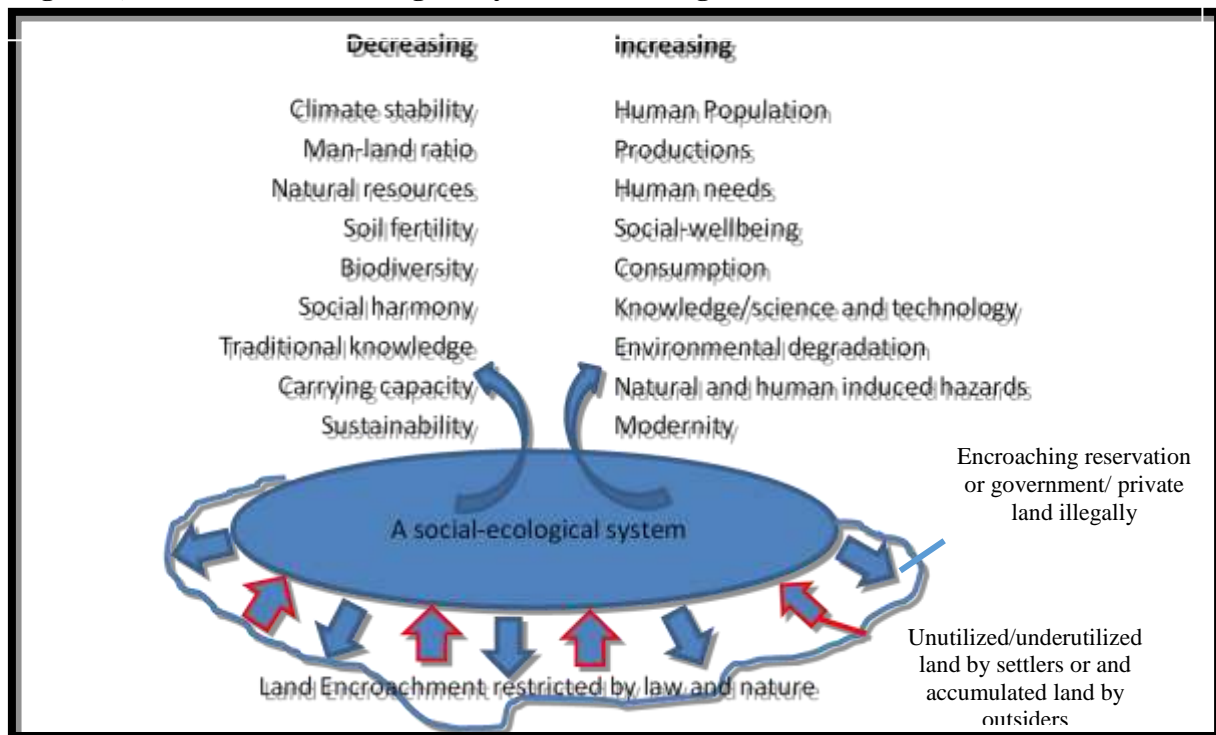
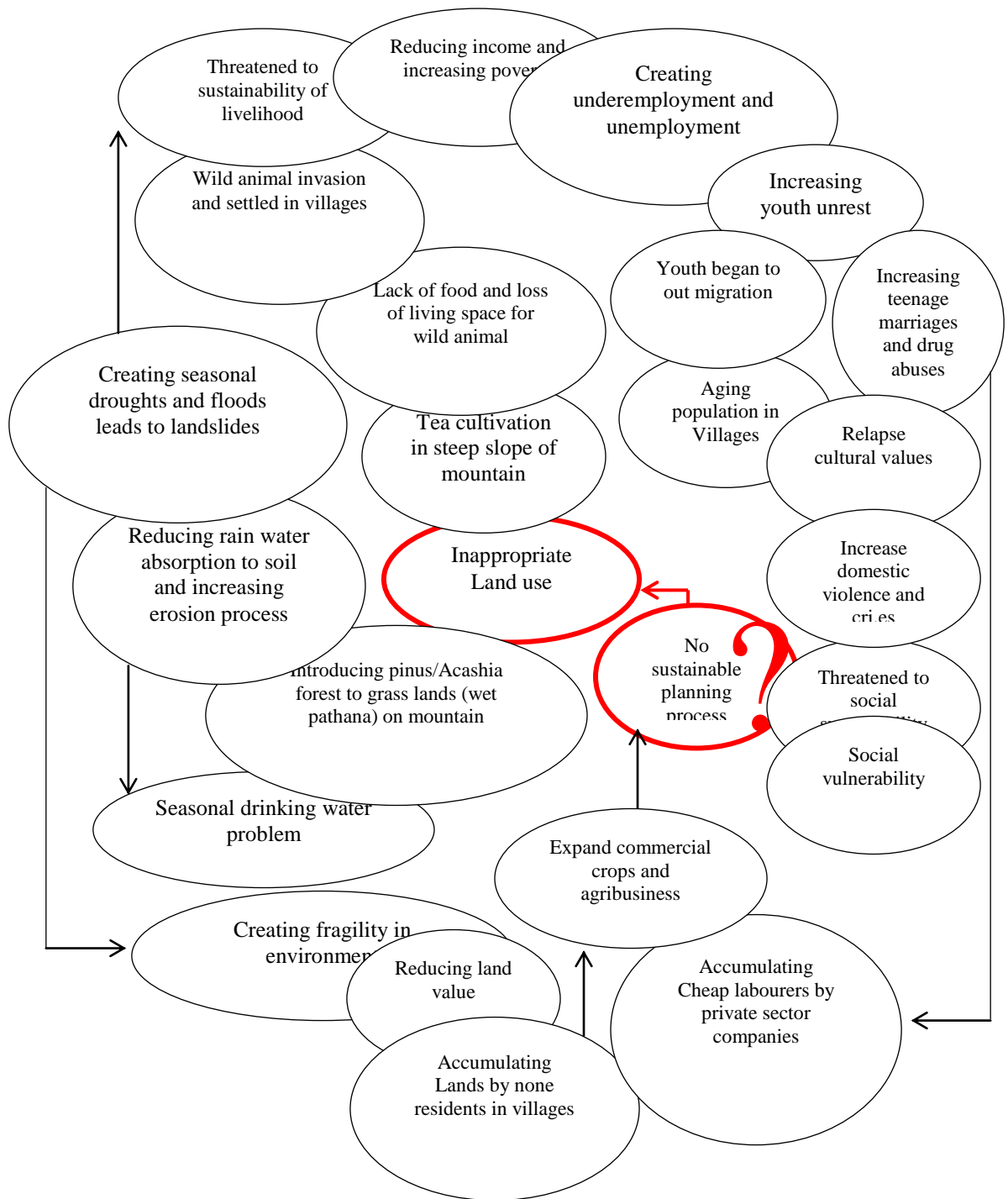


Figure 5; Relationship of the root causes in social-ecological systems in study sites



Source: Conceptualized by Author, 2015

Figure 5; Main land use zones by height of the study sites

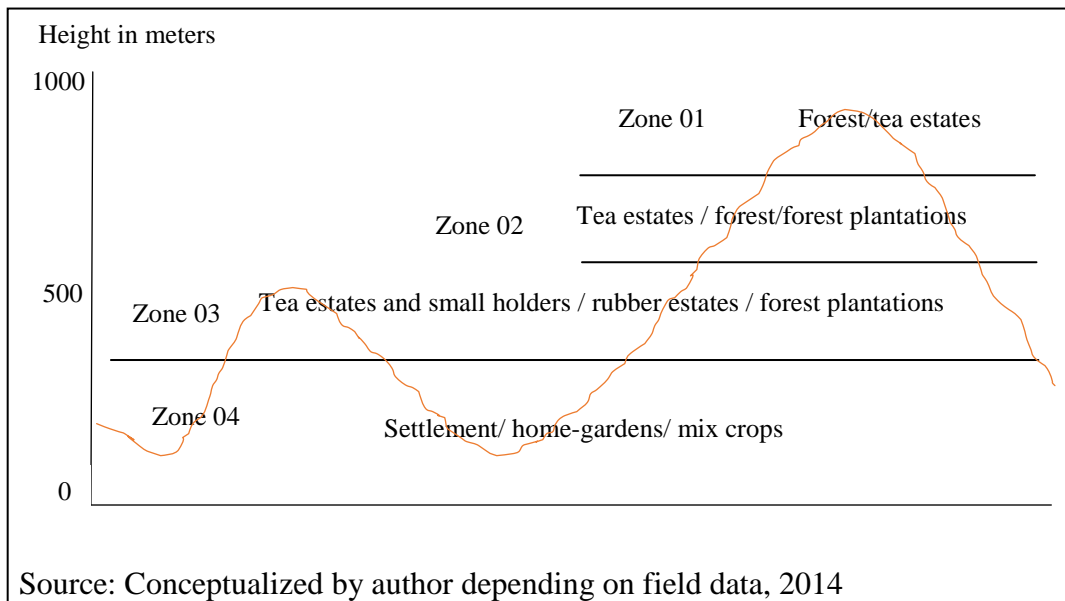


Figure 6;

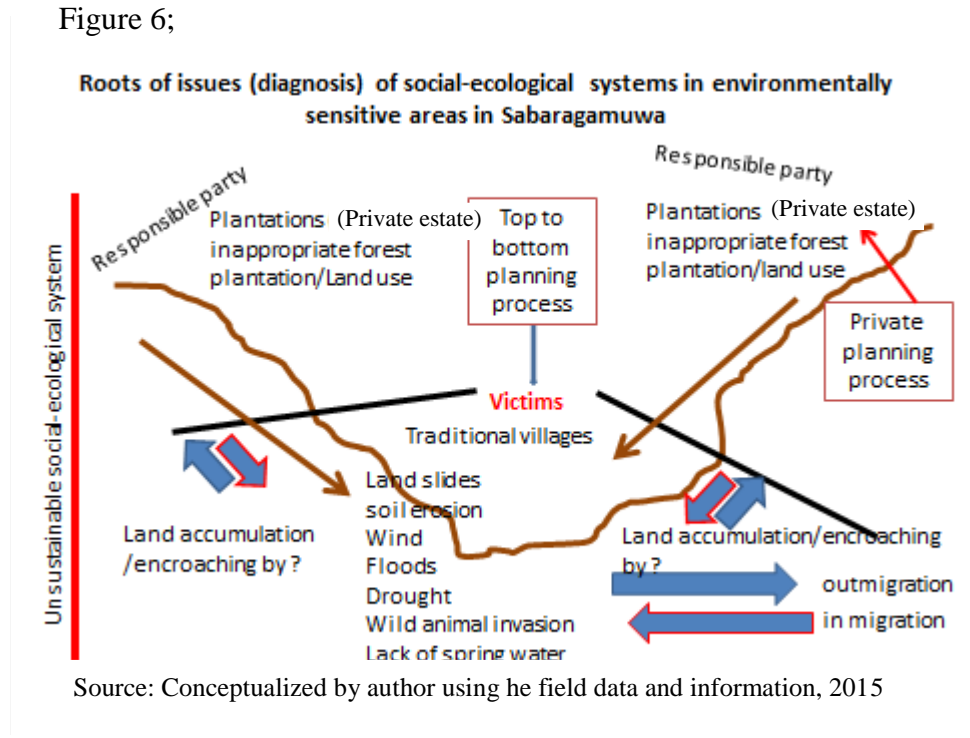


Figure 6 explains the roots of the major issues of the social-ecological systems in the study sites. Inappropriate land use in higher altitudes, resulting from poor planning, has led to landslides, soil erosion, increasing wind hazards, flooding, drought, animal invasion and lack of spring water in the traditional villages of the Sabaragamuwa Province. The large scale tea and rubber estates, managed and initiated by the private sector planning process, to settlements of Sabaragamuwa Province, as described earlier in the chapter. All the traditional settlements of permanent settlers of the study sites are located in the low lying valleys of the Sabaragamuwa province because of their long-held tradition of paddy and chena cultivation. Traditional settlements of the region have become victims of natural and human-induced disasters created by the large scale estates and forest plantations. maximize profit, and the natural forest area and forest plantations, managed by government, are the major responsible parties for protecting or degrading the environment in these environmentally sensitive regions. Under this critical situation, all successive governments of Sri Lanka has introduced the environmental laws, regulations, policies and strategies but private plantations do not pay their attention to mitigate the environmental degradation.

Conclusion

This region has been categorized as an environmentally “fragile” zone by the government since 2007. I argue that these plans and policies should be practiced by the forest department of Sri Lanka and the owners of the large scale tea and rubber estates and private property owners of land slide prone areas of the Province. I noticed clearly that these the land use pattern of surrounding areas of the study sites have not been applied environmentally sustainable maintaining or development strategies to protect the environmental degradation. All the new laws and policies for environmental protection should go to the settlers of the villages not for the owners of the estates. I point out here that the top to bottom development process for these villages has made most of the problem. I believe that the permanent settlers’ participation is vital in the decision making process because it is essential to design a sustainable development plans, strategies and activities for the villages.

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