

Requirements for the Sustainable Development of Economic Activities in Tropical Forest Communities

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Abstract

Tropical forests are storing carbon in their biomass, supporting biodiversity, acting as sources for timber and Non Timber Forest Products, and are the habitat for forest communities. For centuries, most tropical forest communities maintained sustainable forest management, which has led to the sustainment of their living conditions and to an important contribution to the conservation of the environment and the climate. In the last decades this is increasingly threatened by the commercial timber industry which plunders the tropical forests for the extraction of valuable timber.

In this paper we propose a concept of how sustainable development concept can be applied to the living conditions of tropical forest communities. We answer the question of how sustainable development of economic activities for forest communities' inhabitants can be achieved including improvement of their living standard and conservation of tropical forests.

We formalize qualitative causal relations and conclude that sustainable development in forest communities cannot be achieved without 1. legal rights for forest management, 2. targeted investments and initial capital for the organization of economic activities with ecological and social responsibility, and 3. organizational, technical, and methodical support.

Keywords: sustainable development; tropical forest communities; small scale forest enterprises; social responsibility

1. Introduction

Tropical forest ecosystems store carbon, protect certain biodiversity features, regulate local and regional climate, conserve soil and water, and act as sources for timber and other forest products. Despite efforts to protect forests against deforestation, an estimated territory of 13 million hectares forest is deforested yearly (FAO, 2010) which equals to the land area of Greece.

Deforestation causes around 17% of global carbon emissions which is approximately 1.5 times higher than the global emissions from air, rail, road, and shipping traffic combined. Therefore, one of the most cost effective ways to reduce global carbon emissions is by decreasing deforestation and illegal logging. The estimated yearly economic value of illegal logging, along with processing, is between 22 and 74 billion €, or 10–30% of total wood trade (UNEP & INTERPOL, 2012). Tropical forests export primary and secondary timber products exceeding a value of 18 billion € annually (FAO, 2010). There is a global growing demand for timber and timber products which generates pressure on tropical countries for the production of cheap pulp and timber.

The challenge of tropical forest conservation coexists with the challenge of poverty alleviation in tropical forest communities. A large fraction of forests is located in poor and rural areas of developing countries where household livelihoods depend on

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extractive forest uses (Sunderlin et al., 2008). Around 60 million people are nearly completely dependent on forests (Dieterle, 2009). 1.2 billion people, mainly poor, obtain a significant part of their livelihood from Non Timber Forest Products (NTFP) (FAO 2007, FAO 2009, Vantomme, 2011). Until now there is no effective mechanism which can conserve the tropical forests. Top-down conservation strategies such as unpeopled and protected forest areas are widely disputed due to their negative social and economic impact on forest communities and their contribution to the protection of natural resources (West & Brechin 1991, Newmark & Hough 2000, Salafsky & Wollenberg 2000). Studies show that bottom-up forest conservation approaches by forest communities result in lower and less variable deforestation rates than through solely protected forest areas (Porter-Bolland et al., 2012). Forest communities are considered to be the best positioned actors to confront the deforestation processes (Klooster & Masera, 2000). Governments realize that local communities may provide a more sustainable and a cost-effective way for natural resource management than biodiversity conservation institutions (Ezebilo, 2010).

The question we aim to answer is of how to provide the inhabitants of forest communities a perspective so that they can live in the future from the sustainable forest management. It can be assumed that people in the forest communities have originally conducted sustainable forest management, as long as they were not beset by commercial interests of timber companies or were displaced. Currently the existence of many forest communities is destroyed or at least threatened directly or indirectly by the commercial timber industry.

Historically, through sustainable forest management the forest communities have not only retained their own existence, but also made an important contribution to the climate protection. Today, the climate change has reached an alarming high degree dimension, harming many people in the world particularly affecting the poor population of developing countries.

According to Berke and Conroy (2000) there is no general agreement on how the concept of sustainable development can be translated into practice. However, we look at main patterns of tropical forest communities and various components of sustainable development such as economic, environmental, and social and their interactions in order to analyse how sustainable development can be practically implemented into economic activities of tropical forest communities. In this study we present a conceptual framework of how sustainable development in tropical forest communities can be achieved and formalize the interconnections between the social, environmental and economic dimensions of the sustainable development concept.

2. Methods and Materials

In this study we first present the main relevant data regarding the tropical forest communities' livelihood of the Poverty and Environment Network (PEN) study organized by the Center for International Forestry Research (CIFOR). We then introduce the concept of sustainable development and its main components in the context of forest communities. As the result we analyze the compatibility of the forest communities' realities with the theoretical concept of the sustainable development and

introduce the concept of Small Scale Forest Enterprise with Social and Ecological Responsibility (SSFESR) as a possibility to achieve the non-destructive forest use and poverty alleviation in tropical forest communities. We theoretically develop a concept of how the desired equilibrium between the social, economic and environmental components and its interactions can be achieved.

2.1 Common environmental, social and economic characteristics of tropical forest communities

We are using the data regarding the forest communities' livelihood of the Poverty and Environment Network (PEN) study organized by the Center for International Forestry Research (CIFOR). This study combines data from 33 PEN partners including socio-economic and environmental data from 8301 households in 334 villages from 24 countries with close proximity to forests located within tropical or sub-tropical regions of Asia, Africa and Latin America. The study was conducted throughout a 12-month period, using quarterly household surveys with 1–3 month income recall periods. The miscellaneousness of this study allows making overall assumptions of communities' livelihood (Table 1).

We analysed three components of the PEN study: the ecological, economic and social components. Regarding the ecological component we could conclude that although the governmental rules regulating the forest use might exist in many forest communities, they are mostly unclear and not respected by the communities. In Asia and Africa 23% and in Latin America 50% of all interviewed households were occasionally clearing the forest and the average clearing area was 1.4 ha for Africa, 0.8 ha for Latin America and 0.95 ha for Asia. The forest cleared by the households was mostly because of the need for cropping area. Land tenure insecurity is considered as one of the main factors for deforestation. (CIFOR, 2015)

Regarding the economic component we see that forest and non-forest environmental income represents about 1/3 of the total income of communities which approximately equals to the income from agriculture. In order to increase the income from the most profitable forest products, the communities consider better protection of the forest, better skills and knowledge on sustainable harvesting practices as well as legal rights for the use of the forest as most important factors. Better access to credit and capital is an additional factor which in their opinion would lead to improved conditions of economic activities. Altogether communities' inhabitants mostly consider their income as just about sufficient for their livelihood. (CIFOR, 2015)

The social component of the PEN study reveals about the overall satisfaction of the respondents. It shows that although the communities' inhabitants can be considered as poor or very poor, it overall does not decrease their life satisfaction. Most communities' inhabitants (over 70%) consider the villages they are living as a good place to live. (CIFOR, 2015)

Table 1. Representation of the livelihood reality of tropical forest communities (data in percentage of total interviewed participants)(CIFOR, 2015)

		Latin America	Asia	Africa
Ecological	Existing governmental rules that regulate forest use			
	yes, but the rules are vague/unclear	27.19	29.5	14.62
	yes, clear rules exist	8.75	21.64	44.47
	Governmental rules are respected by the community	0.94	4.59	9.68
	Written permission required to harvest forest products	15.31	7.87	24.9
	Forest cleared by communities (pct. of HH clearing forest out of total interviewed HH)	50.14	23.33	23.56
	for cropping (pct. of HH which are clearing forest)	91.7	60.28	91.3
for tree plantations (pct. of HH which are clearing forest)	1.36	3.97	1.35	
Economic	Forest and non-forest environmental income as pct. of total income	31.9	23.2	30.8
	Most important factors to increase income from most important forest products			
	Better protection of forest, avoiding overharvesting	43.46	43.29	41.2
	Better skills and knowledge on harvesting	22.51	21.81	14.42
	Legal rights for forest use	1.57	18.46	8.43
	Better access to credit/capital	14.66	7.05	2.62
	Food production and income sufficiency (just about sufficient or sufficient)			
just about sufficient	42.26	47.27	39.49	
sufficient	27.41	31.56	45.74	
Social	Life satisfaction perception			
	satisfied	38.47	46.48	53.64
	very satisfied	3.92	6.08	7.08
	Consider the village as a good place to live			
	partly	19.77	19.81	14.36
totally	69.35	77.21	77.03	

2.2 Sustainable development concept

Sustainable development is characterized by two constitutive features: 1. the three-dimensionality whereby ecology, economy and social issues should be guided towards a balance and 2. the intra- and intergenerational equity. Especially for forest communities both constitutive features of sustainable development are highly relevant. The sustainable development of economic activities in tropical forest communities can be realized on the background of national wealth as a socio-economic category which describes the initial and final stages of economic activity. Forests represent a potential national wealth of the country and concurrently an importance for the international community as they affect the climate stability, the atmospheric balance, and maintain the

biodiversity. With the growth of national wealth, the awareness of the international community for their social responsibility and the importance of environmental concerns increase, in particular, in the need to conserve the tropical forests. Understanding is rising that tropical forests are of environmental and economic importance and require compensation for their "work".

Institutional development is an integral part of the sustainable development process. Institutions can be defined as systems of established and prevalent social rules that structure social interactions (Hodgson 1988). In general, institutional development is ecologically and socially oriented direction of legislation. It aims to organize social responsibility of entrepreneurial activities which may lead to sustainable development of society.

Conservation of forests and sustainable development of forest communities is an interrelated process. The concept of sustainable development for tropical forest communities can be formulated as such: Achieving welfare for forest communities through economic activities and obligatory monitoring and conservation of the forest and its biodiversity. The aim of forest communities' sustainable development is to conserve tropical forests and to make it a "plantation" with a stable source of income for local inhabitants. Sustainable development of communities' economic activities implies the combination and equilibrium of the following environmental, social and economic dimensions.

2.2.1 Ecological Dimension

Environmental development will enable forest management, reforestation and conservation of tropical forests. Jabareen (2008) defines natural capital as all natural assets which can be modified, but not created by humans. Sustainability in his interpretation is the stock of natural capital which should be maintained in order to provide opportunities for future generations to create wealth and well-being (Jabareen 2008).

Our research is based on the context of natural capital such as tropical forests. Particularly for low-income countries natural capital is a critical asset as it represents an important share (36%) of the total wealth (World Bank 2012). Livelihoods of many subsistence communities in tropical forest countries directly depend on healthy ecosystems (World Bank 2012). At the present stage of development, the international community is no longer considering natural capital as a costless factor in the economic process. Uncertainty with respect to future value of tropical forests as natural capital limits the ability to determine whether it will be possible to fully compensate its lack in the future.

2.2.2 Economic Dimension

Economic development of forest communities in terms of ecological forest management may be possible through modern management and technology resulting in creation of new jobs for work with NTFP and for sustainable forest management.

Traditional economics argues that profit maximization plus customer satisfaction in

the market system is consistent with maximization of well-being and that market failure can be corrected through governmental policies. Currently, a consensus is arising that profit maximization can no longer be regarded as the exclusive goal of companies (Kleine & von Hauff 2009). The emergence of the sustainable development concept changes the attitude towards fundamental basis of conventional economics as of unlimited economic growth. A combination between social and environmental factors has to be considered for economic development. Economics in terms of sustainable development believes that short-term profit maximization and short-term meeting of consumer's needs could lead to depletion of natural or social resources, the degradation of society, nature or biodiversity, or to climate change.

2.2.3 Social Dimension

Social development of forest communities will enable communities' inhabitants to organize, to divide tasks and as a result to benefit from economic development such as living standard improvement, poverty alleviation, education, and health care provision. The social component of the sustainable development concept is focused on human rights and aims to develop and, at the same time, maintain the stability of social and cultural systems. Part of this approach is the division of benefits which provides or may provide the tropical forest to the local communities.

The social capital is a component of sustainable development and can be understood as the ability of people to work together for common purposes in groups and organizations (Fukuyama 1995). In the context of tropical forest communities, without investments into social capital as economic and social resource for obtaining public benefits from forest conservation, predatory use of tropical forests and exploitation of forest communities' inhabitants might continue.

Another part of the social component is the human capital. Human capital is regarded as a complex of knowledge and skills that are used to meet the needs of individuals and the society as a whole (Burkhard 2004). Human capital of communities' inhabitants lies in the traditional knowledge about the forest, forest products, and traditional medicine. Schultz (1981) argues that improving the wellbeing of poor people does not primarily depend on the land, natural resources and technology, but on their knowledge. The "heart" of human capital theory is the added value that employees can create for their organization. It considers employees as assets and stresses that investing in them will increase the profit of the organization. Human capital is needed in order to achieve sustainable development in tropical forest communities.

3. Results: Compatibility of the sustainable development and forest communities' economic activities– Small Scale Forest Enterprise with Social and Ecological Responsibility (SSFESR)

The tropical forest communities live substantially with subsistence economy wherein the living standard remains low. For sustainable development of economic activities in forest communities, economic strategy and investment schemes might be required.

According to the analysed PEN study the main challenges for poverty alleviation in forest communities and for the organization of economic activities are (1) the lack of legally secured access to the nearby forest, (2) lack of skills and knowledge on sustainable NTFP harvesting practices, (3) the lack of legal rights to use and manage the forest resources, (4) the lack of initial investments into the establishment of enterprises, and (5) the lack of methodological, technical, and organizational support for enterprise development.

Our hypothesis is that the establishment and development of an enterprise in a forest community as a legal entity may allow increasing the revenue of communities' inhabitants with organizational methods and lead to sustainable forest management. As such it may lead to acquisition of credits for initial investments into enterprise establishment including implementation of processing facilities for adding value to forest products and organization of a team of workers who will be able to negotiate on the selling prices of their products with the intermediaries or overcome the intermediaries and transport their products further to the markets.

The actions which might lead to the non-destructive forest use nearby the communities are a combination of: (1) legally secured access to the nearby forest based on a forest management contract, clearly defining the rights and responsibilities of the community in the use and management of forest resources, (2) means of reporting about illegal logging to authorities, (3) methodological support in sustainable harvesting and forest usage practices, and (4) economic incentives for forest conservation. Legal rights provide an incentive for non-destructive forest use and forest conservation.

The combination of the action strategies targeted at overcoming the two challenges, destructive forest use and poverty in forest communities, suggests the establishment of a Small Scale Forest Enterprise with Social Responsibility (SSFESR) as a legal entity in targeted forest communities. We define SSFESR as an enterprise managed and employed by indigenous and other local communities, which is aimed at making profit from sustainable harvesting, processing and trade of Non-Timber-Forest-Products (NTFP) and sustainable timber management practices. In our study, social responsibility describes the need for conserving tropical forests and for raising the living standards of forest communities' inhabitants. As a consequence of the SSFESR, following benefits can be achieved: an environmental benefit through the forest conservation and forest monitoring, an economic benefit through the increase of income, and a social benefit through the creation of working places, poverty alleviation, infrastructure development, and the professional training. Figure 1 highlights the cause-and-effect relationships of the SSFESR.

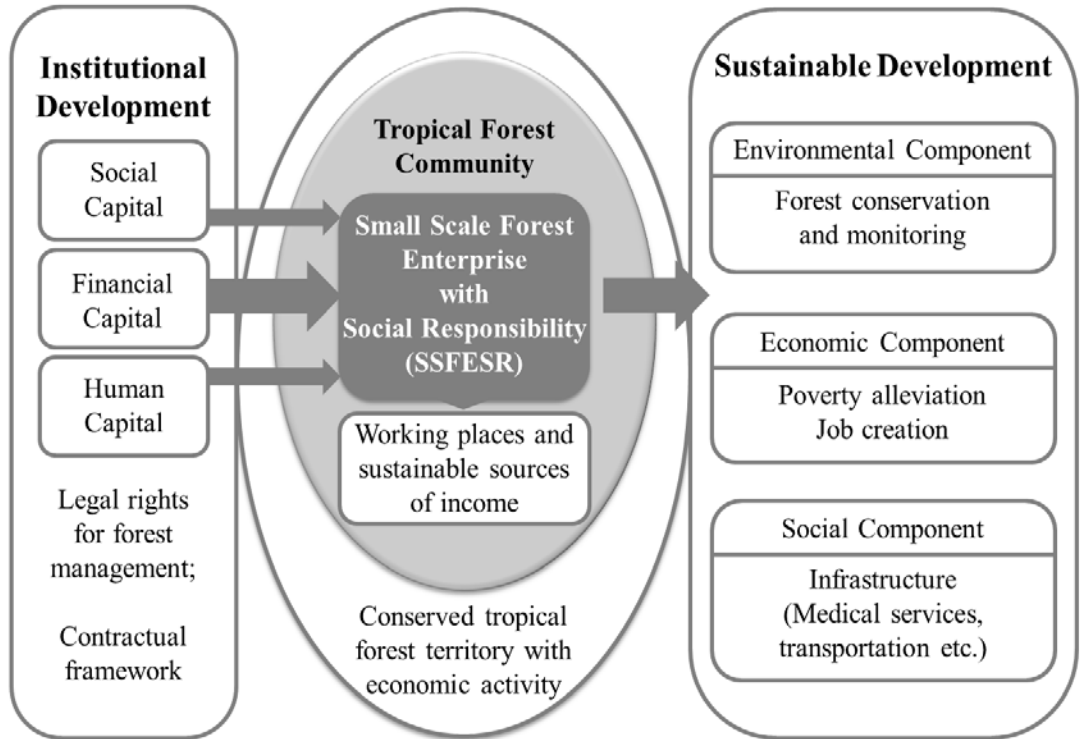


Figure 1. Cause-and-effect relationships of the Small Scale Forest Enterprise with Social and Ecological Responsibility

SSFESR can be developed on the background of institutional development with legally secured access to the nearby forest, the rights to use and manage the forest resources, a taxation framework and the contractual framework between the forest owner and the forest users while describing the legal basis for external financial investments. In our case institutional development would also include legal rights for forest management with regulated ownership of forest territory which can be used for economic activities and is to be monitored.

Organization of economic activities through the establishment of SSFESR on the basis of a mandatory condition for monitoring and conserving the forest might empower sustainable forest conservation and at the same time increase the welfare of forest communities through work with NTFP. SSFESR is based on the assumption of equal rights between all community members for the collection of NTFP inside the forest and for the usage of processing facilities. Assets of the enterprise are legal rights for forest management. The main activity of the forest enterprise, which does not own the forest, can result on the basis of a forest management agreement. Without such an agreement, legal enterprise activities inside of forest communities might not be possible.

SSFESR employees are dedicated to monitor and conserve the forest, to apply the sustainable forest usage practices, and to inform the authorities about illegal logging.

Means of reporting to authorities are a possibility to inform the higher instances if illegal logging is happening in the nearby forest area.

The benefit from the investments into the SSFESR is the poverty alleviation and the conservation of tropical forests for future generations as a component for climate stabilization and biodiversity conservation. SSFESR is not an aim in itself but a tool for establishment of sustainable income sources for communities' inhabitants. It is a legal entity which is a requirement for receiving financial investments and legal rights for forest management and monitoring, for accessing the wholesale markets, for obtaining bank loans, and a fair distribution of income between forest communities' inhabitants. To create SSFESR external investments may come from governments, international community, and from companies with corporate social responsibility. As a legal entity SSFESR is able to receive financial capital for the enterprise development.

Table 2. Parameters characterizing the interaction between components of sustainable development concept

Indication of parameters or processes		Designation [unit of measurement]
Economic Component	Investments into development of forest community's economic activities	$I, [€]$
	Value of output obtained after investment	$L_x, [€/kg]$
Social Component	Number of working places in forest community before investment	$P_1, [person]$
	Number of working places after investment	$P_2, [person]$
Environmental Component	Increase in the number of working places	$\Delta P = P_2 - P_1$
	Forest area monitored by the community	$S_0, [ha]$

We link the sustainable development of tropical forest communities to the social responsibility within the SSFESR and within the national government and international community. For the international community the conservation of tropical forests has a direct benefit of climate stabilization and biodiversity conservation for future generations.

For the development of the SSFESR, social and human capitals are needed. Increasing the social capital in forest communities would lead to environmental benefits such as organized forest conservation or sustainable harvesting practices and economic benefits such as the division of tasks or the negotiation power on selling prices for the produced goods.

Social and environmental challenges in tropical forest communities depend on the solution of economic organization of forest communities' inhabitants. The proposed interaction mechanisms present functional causal relations of theoretical concepts. Basic parameters of economic, social and environmental components within the concept of sustainable development are presented in Table 2.

3.1 Interaction between economic and environmental components

The interaction between economic and environmental components creates the possibility for valuation of tropical forests' conservation and for calculating the environmental impact. The World Bank report notes that a farmer who cuts down one hectare of tropical forest with its rich biodiversity, in order to make a pasture worth 220,-€, releases 500 tonnes of carbon dioxide into the atmosphere while burning the felled trees. For such emissions companies in industrialized countries with carbon price pay about 5.500,-€ to meet their obligations of reducing carbon emissions (Chomitz, Buys, De Luca, Thomas, & Wertz-Kanounnikoff, 2007).

The economic approach is the maintenance of total capital through which revenue is produced. In case of forest communities, this capital is the tropical forest which is an integral part of natural and social capital of humanity.

Trees and products growing in the forests, fish inside the river etc. are of no value from an economic point of view. The price for these products is created through the work which is invested into the harvesting, processing, packaging of these products and bringing them to the market. In a free market, value is created by workers of the enterprise, but the main income receives the manager during final sale of the product. An option is that income from NTFP processing would stay inside the community but marketing and sale would be handed over to qualified specialists with social responsibility under the condition of profit sharing with the small scale forest enterprise.

Increase of investments into the infrastructure development results in a rise of monitored forest area incorporated into communities' economic activities. There is a correlation between investments volume - $F(I)$, [€], increased value of produced products L_x , [€/kg], number of workers ΔP , [person], and monitored forest area S_0 , [ha], see Equation 1. S_0 , [ha] is a discrete value and cannot exceed forest area assigned to the community for use and monitoring.

$$S_0 = F(I, L_x, \Delta P)$$

Equation 1. Dependence between the investments I , [€] produced products L_x , [€/kg] number of workers ΔP , [person] and the monitored forest area S_0 , [ha]

3.2 Interaction between environmental and social components

In this study, social responsibility describes the need for conserving tropical forests and for raising the living standards of forest communities' inhabitants. The interaction between environmental and social components discloses the possibility to address the social justice within the current generations in regard with the next generations. Environmentally balanced economic activity inside of tropical forest communities is an inseparable complementary process. Monitoring and conservation of forests, controlling of harvesting and usage of NTFP, reforestation of degraded and deforested areas are criteria of the environmental component of forest communities' sustainable development. Harvesting of NTFP should remain sustainable and not result in overharvesting or interference with natural regeneration and maintenance of biological balance.

Investments into development of economic activities lead to job creation, to forest conservation, to decrease of migration to metropolitan areas, and to maintenance of community living in this region. The formalization of the sustainable development components allows showing the interdependence between the number of workers $F(\Delta P)$, [person], and the monitored forest area S_0 , [ha], see Equation 2.

$$F(\Delta P) = F(S_0)$$

Equation 2. *Dependence between number of workers ΔP , [person] and monitored forest area S_0 , [ha]*

3.3 3.3 Interaction between social and economic components

Intragenerational equity aims to achieve a fair allocation of resources between the people of developed and developing countries and between competing interests at the present time (Jabareen, 2008). By providing technical assistance in organization of economic activities for harvesting, processing, and marketing of NTFP with sustainable forest management to forest communities, both intra- and intergenerational justices can be achieved. This includes fair trade of NTFP between developing and developed countries and sustainable forest management by forest communities' inhabitants. An option for assistance of communities' inhabitants is to include the creation of new workplaces and establishment of processing facilities for local NTFP, as a possibility to add value to the products.

Forest communities' inhabitants should be involved in the processes that shape their sphere of life, should contribute to decision making processes and monitor the implementation of these decisions. A social topic of forest communities is the fight against poverty, improvement of living standards and the stabilization of demographic situation such as lessening the migration of community's youth to the metropolitan areas and, ultimately, conserving the forest communities.

People are required who on the one hand understand the importance of the challenge of conserving tropical forests and on the other hand have managerial skills of organizing a small scale forest enterprise. Local inhabitants of tropical forest communities mostly do not have trained labour that would be able to organize and to manage small scale forest enterprises. There is a need either for training of local inhabitants or for external managers. In order to make the concept multipliable, a possibility of providing human capital to forest communities might be environmental voluntary and within it volunteers that would bring economic, organizational and technical knowledge to forest communities.

Through investments I , [€] into development of economic activities, new working places for P_2 , [person] are being established. This increases not only the income and quality of life of the workers but also of their families. The determining factor in improving quality of life is the growth of working places ΔP which is the result of investments I , [€], see Equation 3.

$$\Delta P = F(I)$$

Equation 3. *Dependence between investments I , [€] and number of working places P , [person]*

3.4 Interactions between various components within the concept of sustainable development

The proposed functional dependencies allow making predictions of economic development with an analysis of possible outcomes as well as recommendations of best practices for environmental and economic policies while providing social outcomes. The proposed interaction mechanisms present functional causal relations of theoretical concepts. These interactions between various components within the sustainable development concept present a dynamic model of interdependent quantifiable variables (Figure 2). All parameters have discrete values, wherein the amount of investments depends on specific technical conditions. In particular the number of jobs in a community cannot exceed the number of community’s inhabitants, and the forest area used for collection of NTFP cannot exceed the forest area legally approved to be monitored by community inhabitants.

For this model profit is not the main factor determining a usual private investment, but the environmental and social returns on investment. Environmental solutions with social consequences and a base on economic methods depend on the use of proposed tools.

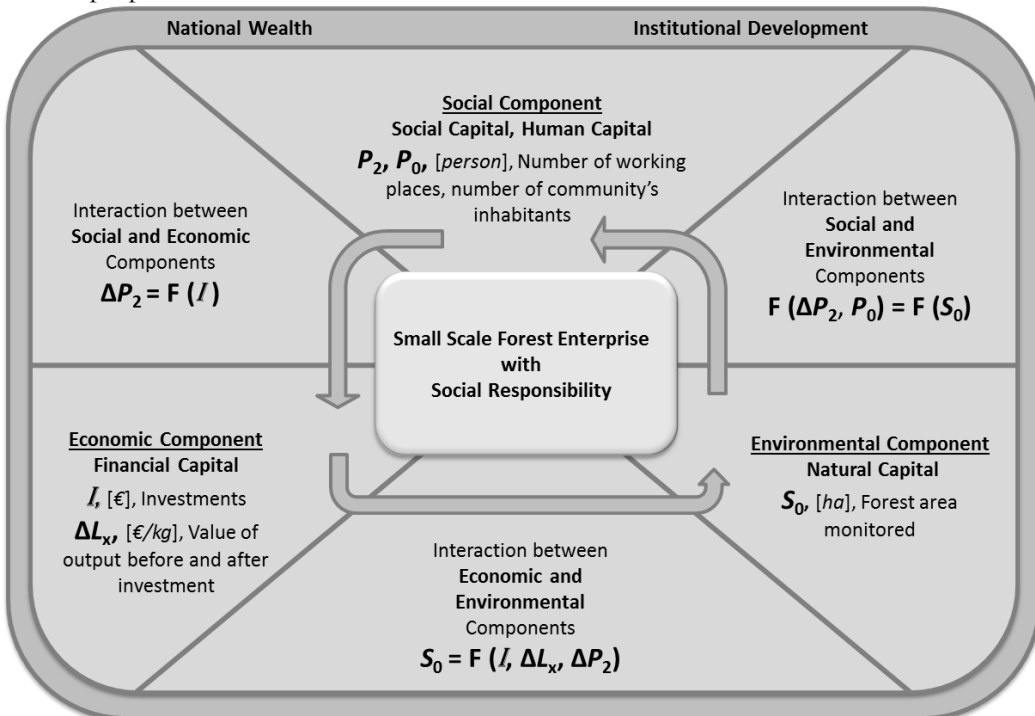


Figure 2. Sustainable development of tropical forest community and its components

Conclusion

Sustainable development of tropical forest communities can be achieved with help of external support such as financial capital which includes initial capital for the establishment of the SSFESR, human capital with methodical and organizational assistances, and institutional development including legal rights of forest communities for forest management. Benefit of international community for investments into SSFESR is the conservation of tropical forests for future generations as a component for climate stabilization and biodiversity conservation. Sustainable development of the tropical forest community can become a consequence of financial investments supported by social and human capital realized on the basis of institutional development.

References

- Berke, P. R., & Conroy, M. M. (2000). Are we planning for sustainable development? An evaluation of 30 comprehensive plans. *Journal of the American Planning Association*, 66(1), 21–33.
- Burkhard J. (2004). Humankapital und Unternehmenskultur
- Chomitz, K. M., Buys, P., De Luca, G., Thomas, S. T., & Wertz-Kanounnikoff, S. (2007). At Loggerheads? Agricultural Expansion, Poverty Reduction, and Environment in the Tropical Forests (Overview). The World Bank. Retrieved from http://siteresources.worldbank.org/INT/TROPICALFOREST/Resources/2463822-1161184206155/3060670-1161608416166/PRR-AL_SAOOverviewwebnonembargo.pdf
- CIFOR.(2015).CIFOR's Poverty and Environment Network (PEN) global dataset, <http://hdl.handle.net/11463/10060> Center for International Forestry Research
- Dieterle, G. (2009). Sustaining the World's Forests: Managing Competing Demands for a Vital Resource – The Role of the World Bank. In P. Spathelf (Ed.), *Sustainable Forest Management in a Changing World* (pp. 9–32). Springer Netherlands. Retrieved from http://link.springer.com/chapter/10.1007/978-90-481-3301-7_2
- Ezebil, E. E. (2010). Community-based preferences for economic incentives to promote biodiversity conservation in a tropical rainforest. *International Journal of Environmental Research*, 4(3), 501–506.
- FAO. (2007). *State of the world's forests 2007*. FAO, Rome, Italy;[cited 2013 Aug 23]. Available from: <http://www.fao.org/docrep/009/a0773e/a0773e00.htm>
- FAO. (2009). *Forests and poverty reduction*. FAO, Rome, Italy;[cited 2013 Aug 23]. Available from:<http://www.fao.org/forestry/livelihoods/en/>
- FAO. (2010). *Global Forest Resources Assessment 2010. FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS*.
- Fukuyama F. 1995. *Trust : the social virtues and the creation of prosperity*. London: Hamish Hamilton.
- Hodgson GM. (1988). *Economics and Institutions*. *Journal of Economic Issues* 1: 1–25.
- Jabareen, Y. (2008). *A New Conceptual Framework for Sustainable Development*, 10(2).
- Kleine A, Von Hauff M. (2009). Sustainability-driven Implementation of Corporate Social Responsibility: Application of the Integrative Sustainability Triangle. *Journal of Business Ethics*. 85: 517–533.
- Klooster, D. & Masera, O. (2000). Community forest management in Mexico: carbon mitigation and biodiversity conservation through rural development. *Global Environmental Change-Human and Policy Dimensions*, 10(4), 259–272. [http://doi.org/10.1016/S0959-3780\(00\)00033-9](http://doi.org/10.1016/S0959-3780(00)00033-9)
- Newmark, W. D., & Hough, J. L. (2000). Conserving Wildlife in Africa: Integrated Conservation and Development Projects and Beyond Because multiple factors hinder integrated conservation and development projects in Africa from achieving their objectives, alternative and complementary approaches for promoting wildlife conservation must be actively explored. *BioScience*, 50(7), 585–592.
- Porter-Bolland, L., Ellis, E. A., Guariguata, M. R., Ruiz-Mallen, I., Negrete-Yankelevich, S., & Reyes-Garcia, V. (2012). Community managed forests and forest protected areas: An assessment of their

- conservation effectiveness across the tropics. *Forest Ecology and Management*, 268, 6–17. <http://doi.org/10.1016/j.foreco.2011.05.034>
- Salafsky, N., and E. Wollenberg. 2000. Linking livelihoods and conservation: A conceptual framework and scale for assessing the integration of human needs and biodiversity. *World Development* 28:1421–1438.
- Schultz, T.W. (1981). *Investing in People: The Economics of Population Quality*. University of California Press.
- Sunderlin, W. D., Dewi, S., Puntodewo, A., Müller, D., Angelsen, A., & Epprecht, M. (2008). Why forests are important for global poverty alleviation: a spatial explanation. *Ecology and Society*, 13(2), 24.
- UNEP & INTERPOL. (2012). GREEN CARBON, BLACK TRADE - A RAPID RESPONSE ASSESSMENT ILLEGAL LOGGING, TAX FRAUD AND LAUNDERING IN THE WORLD'S TROPICAL FORESTS.
- Vantomme, P. (2011). The Silviculture of Tropical Nonwood Forest Products, Between Farming and Forestry. *Silviculture in the Tropics*, 8, 119.
- West P, Brechin S. (1991). National parks, protected areas, and resident peoples: A comparative assessment and integration. Pages 363–400 in P. West and S. Brechin (eds.), *Resident peoples and national parks: Social dilemmas and Strategies in international conservation*. The University of Arizona Press, Tucson.
- World Bank. (2012). *Natural Capital Accounting*; [cited 2013 Jan 24]. Available from: <http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTSDNET/0,,contentMDK:23168586~pagePK:64885161~piPK:64884432~theSitePK:5929282,00.html>