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Review

Unique Forest Ecosystem under Threats

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Yeki-Godera Forest of Southwest Ethiopia is recognized as unique forest ecosystem, for its diverse biological richness and since it is the world's birthplace of *Coffea arabica* that still harbors its last wild coffee populations. The natural wealth surrounding this unique forest ecosystem is therefore invaluable heritages for all mankind in general and the Ethiopian in particular. Because it is still reserve of flora and fauna and a source of genetic materials for the adaptation and improvement of plant species presently in use, and those whose value is yet to be ascertained. But Perennial cash crops such as coffee, tea, rubber and palm oil are expanding at the expense of the biodiversity and wildlife habitats; because in economic terms, there is little understanding of the value of the goods and services provided by forests. It is therefore, more susceptible to being converted to other land uses which are perceived to be more beneficial. This unique forest ecosystem is therefore undervalued, but it produces many different products that are consumed in many unrelated markets often outside the cash economy. It produces many locally-marketable goods (e.g. wild coffee, forest food, spices, fibers, civet, and honey) as well it has environmental services (e.g. climate control, water regulation, soil conservation) that do not enter into the national economic accounts. 'Downstream' irrigation benefits of 'upstream' conservation are enjoyed but not paid by beneficiary estate farms; hence the unique forest ecosystem is viewed as 'free commodity'. And there are still much unknown about the potential values of this forest, a consequence of the lack of systematic research. This paper summaries and place monetary values on the complex array of goods and services provided by the unique forest ecosystem. And suggest that before the decisions of conversion of the unique forest ecosystem to perennial export cash crop land uses, it explores the needs of a complete understanding as possible of the true values of all the goods and services that the unique forest ecosystem can provide.

Key Words: unique ecosystem, wild coffee, cash economy, environmental services,

INTRODUCTION

Yeki-Godera unique forest ecosystem of southwest Ethiopia forms the 250,000 hectare high national priority forest area (EFAP: Ethiopian Forest Action Program, 1994). As per the study of EFAP, 1994, of the total area 50,000 ha is slightly disturbed, while the remaining 200,000 hectare is heavily distributed. It is characterized by diverse biological richness. This forest ecosystem is not only home to a variety of useful plant species, it is also home to large colonies of wild bees and wild animal species, such as Colobus Monkey, Olive Baboon, Wild Cat, Honey-Bager, Civet-Cat, Grey Duicker, Bush Babby and bird species such as Abyssinian Ground-Thrush, Watted-Ibis and Black Faded Forest Oriole (EWNHS: Ethiopian Wildlife and Natural History Society, 1996). As well it supports indigenous peoples. Since ancient times and there are also

evidences of coexistence of the Sheko, Mejenger and Bench are the major indigenous people living within the forest and driving their livelihood. They know the food and medicinal properties of plants and understand the value of the forest as an intact ecosystem. The unique forest ecosystem in fact has influenced their collective imaginations, belief systems, and culture, thereby shaping their very identity. However in the recent past, with the arrival of new settlers from other parts of the country, conversion of patches of the forest into agriculture and the expansion of the semi-forest coffee system (Semi forest is a modified forest coffee, where farmers have selectively or deliberately up rooted the second and/or highest strata, simultaneously, the regeneration of young trees and spices is also halted by slashing while the coffee density is increased by planting new seedlings) through removal of trees and undergrowth had reduced the forest cover.

Currently the presence of huge potential for timber, coffee, tea, rube and etc production in this forest have become very much attractive to various investment endeavors. There are also cases where investors have already huge profits by selling timber only from the forest and left the areas without any tax payment or implementation of their proposed projects. Ruthless destruction of the natural forests as well as degradation of the various habitat types in the unique forest ecosystem made the area to be the most vulnerable and threatened ecosystem. On the other hand the National Policy on Forest Resources of Ethiopia (Forest Development, Conservation and Utilization Proclamation, Proclamation No. 542/2007, Federal Negarit Gazeta of the Federal Democratic Republic of Ethiopia) clearly indicated that the unique forest ecosystem should be kept primarily for protection and conservation purposes. Commercial utilization, according to the policy, is secondary objective. However, the present management of this ecosystem fails to achieve its major primary objective. Actually the forests are declining both in quality and quantity at a faster rate in this decade than ever before, and the existing forest polices do not work at all.

Location of the study area

Yeki Godera unique forest ecosystem is located in Sheko Zone of the Southern Nation Nationalities and Peoples Regional State (SNNPRS) and Mejenger Zone of Gambella Regional State. It is located some 600 km southwest of Ethiopia. Geographically it is located between Latitude 7^0 51^1 to 7^0 8^1 and Longitude 34^0 25^1 to 35^0 17^1. It is found between 1,500 masl and 2,600 masl. The Mean annual temperature averages 21^0c and rainfall is often in excess of 1800 mm per annum. The topography is undulating to steep slopes divided by valleys of perennial streams surrounded by Montana rain forests. As per the study of Ex- Ministry of Coffee and Tea Development (MCTD 1994) the soils are moderately acidic with a high cation exchange capacity and Acrisols, Regosols and Nitosols are dominantly observed. It is largely uninhabited except for a scattering of isolated indigenous forest dwellers who gathered forest produce as a livelihood. A few communities also existed along the highways and roads that connect towns such as Mizan-Teferi, Sheko, Tepi and Godera Towns.

METHODOLOGY

Several studies have been conducted to investigate the values of forests and a desk review of the main issues regarding the threats on the unique forest ecosystem was conducted at the outset of the study to identify the determinants. The study used a mix of qualitative and quantitative methods for analysis. This included review of relevant studies and documents, discussion with resource personas, personal observation and discussion with key informants. Individual and group memory surveys were employed in interviewing coffee extension workers. Discussions with experts within the Ministry of Agriculture, review of project documents, research articles and academic theses were also utilized.

RESULT AND DISCUSSIONS

The unique forest ecosystem

All land in Ethiopia is owned by the government and grants use rights for farmers regarding agricultural activities. But forest is considered *de jure* as a public good. *De facto*, however, the Sheko, Mejengir and Bench indigenous people

have complex traditional systems of forest-use rights. These indigenous people mainly survive on forest by-products gathering. They collect honey from the towering trees, coffee beans from wild coffee bushes, *Aframomum korarima* (Ethiopian cardamom), chilies, basilica, and ginger from the ground floor of the forest strata as well civet-perfume. Management and use of the Forest's resources has traditionally been tied with customarily lows. Access to beekeeping to this forest is inherited from forefathers and recognized by the village chiefs and communities as legal ownership. Communities routinely make decisions about access over common property and have clear traditional conflict resolution mechanism on wild honey colony, while harvesting spices and root crops is communal that every member of the community has the right to harvest any time the year (personal communications). Forest trees' are protected by taboos and for generations the species composition has been sustained as a multistorey strata; ranging from a high towering (emergent) tree species such as *Aningeria adolif (Kerero), Polyscia fulva (Yezinjero wonber), Morus lacteal (Gonji), Manilkora butugi (Butigi)* reaching a height of 50 meter and above. This is followed by trees communities (forest canopy) with height ranging from 30 to 50 meters, such as *Cordia African (Wanza), Ficus vasta (Shola), Albizia schimperiouna (Sessa) Millettia ferruginea (Birbira),* while the lower strata (understorey) is dominated by *Galinera coffeodes and Caffea arabica* (wild coffee) at a height of 8 meters. The ground stratum includes *Aframomum korarima and* wild spices, such as ginger, chilies, and etc (E.D.E Consulting, 1998).

Because of its biodiversity resources, The Ethiopian Forest Action Program (EFAP) designated Yeki-Godera unique forest ecosystem among *Forest Priority Areas of* Ethiopia *(1994).* Following this it was also designated as *Coffee Gene Reserves* (1998) *within the Coffee Improvement Programs* by Coffee and Tea Authority (CTA). These two initiations were attempts to establish long term user systems and had helped to minimize the destruction of the unique forest ecosystem. However, since these initiatives were not gazette as demarcated reserve area by a legal notice; it is not possible to halt or advocate legally the current encroachments and the races of investments into the unique forest ecosystem as export revenue-yielding property.

Though under threats, the Yeki-Godera unique forest ecosystem is still reserve of flora and fauna and a source of genetic materials for the adaptation and improvement of plant species presently in use, and those whose value is yet to be ascertained. The multistorey plant communities are complex chemical storehouses that contain many undiscovered biodynamic compounds with unrealized potential for use in modern medicine. We can gain access to these materials only if we study and conserve the species that contain them. Nevertheless, due to the current races of perennial cash crop investments, we are losing at alarming rate our greatest biological treasures as we are beginning to appreciate their true values. The driving force behind this loss is the government's seeks to 'Large-Scale Agricultural Investment' to boost export; while there are important alternatives than conversion of the unique forest ecosystems. (Figure 1)

Values and uses of the unique forest ecosystems

Universally, awareness of local and global values of forests has grown considerably over recent years. However, in many cases high forest value, often based on significant environmental benefits, is meaningless to decision makers. The need to understand the values of the unique forest ecosystems of Ethiopia arises from the fact that the area of forest, and hence biodiversity and important forest functions, is declining at alarming rate. The following sections review and summaries to place monetary values on the complex array of goods and services provided specifically relevant to the unique forest ecosystem of Yeki-Godera.

Carbon Sequestration Value

Carbon sequestration is the process by which atmospheric carbon dioxide is taken up by trees, grasses, and other plants through photosynthesis and stored as carbon in biomass (trunks, branches, foliage, and roots) and soils. The values related to carbon sequestration of the forests has two values one is environmental (global) that is the forests contribute to mitigation

Figure 1. Typical views of the Yeki-GoderaUnique Forest Ecosystem. It is internationally renowned for its high biodiversity and wild coffee (*Coffea arabica*) resources, but severely threatened by deforestation.

The Abyssinian Ground-thrush *(Zoothera piaggiae)* A bird of the unique forest ecosystem, thought to be declining due to habitat loss

of climate change by absorbing CO_2 emissions, while the second is the monetary value (local).

Carbon sequestration through conserving the unique forest ecosystems has therefore the potential to play a significant role in ameliorating global environmental problems such as atmospheric accumulation of Green House Gasses (GHG's) and climate change. With the newly emerging Carbon Credit Trading attractive foreign exchange 'hard currency' can be generated by protecting the unique forest ecosystem without isolating it from its traditional production and service functions. Using the estimated average above ground wood biomass of 82 tons/ha and using the accepted method of calculating below ground tree biomass gives a value of 17 tons/ha. Total biomass is 99 tons/ha (J.P. Sutcliffe, 2009). The carbon ratio for wood biomass is 0.5 giving an estimated carbon mass of 49.5 tons C/ha for the forest ecosystems with a net present value of US$185 per ha per annum. Thus for clearing 1000 ha of the unique forest ecosystem the loss is about $ 185,000 while for clearing 5,000 hectare the loss would be about $925,000 per annum.

Hydrological Function

Rivers such as Gilo and Alwaro originate from the forest ecosystems of Yeki-Godera. Specifically Alwaro River, which has a dam built with potentials to provide irrigation water for more than 10,000 hectare in the downstream plains of Gambella Regional State, originate from the mountains and hills of the Yeki-Godera unique forest ecosystems. These forests play an important regulatory role in hydrological processes. Because, the uphill forests capture and store rainfall and moisture, maintain water quality, regulate the river flow, reduce erosion and protect landslides. Increased infiltration recharges underground storage. Reduced sedimentation coupled with uptake of soil water by forest plants has various added advantages that include reduced load of nutrients and pollutants entering water bodies and being exported downstream. In areas of good forest vegetation cover, water is released to streams and rivers slowly instead of in flush floods and ensures regular supply of water and soil moisture over a longer period of time is assured. In the absence of vegetation, permanent rivers gradually change into intermittent rivers and progressively into dry riverbeds. Ground water level will also decrease leading to drying up of springs that supply to the river systems.

The hydrological function of the unique forest ecosystem cannot be directly valued in terms of monetary, but Salman Hussain.et.al. (2007) estimates the monetary value of regulating water flow by tropical rain forest as $36 per hectare per year. In this regard the "downstream" Alwaro large

scale irrigation scheme in Gambella benefits from the "upstream" watershed conservation of the Yeki-Godera forest ecosystems, with no payment by the estate farms (investors). In principle a hydrological fee should be established to collect for irrigation utilized water, to be reinvested in forest conservation in the upstream Yeki-Godera forest watersheds.

Eco Tourism Values

Eco tourism is a growing activity and constitutes a potentially valuable non extractable use of the forest ecosystem. The unique forest ecosystems of Yeki-Godera of the southwest Ethiopia hold wide range of eco tourism opportunities. They are habitat for a variety of fauna and flora. Educational tourism such as agronomists, wildlife specialists, foresters, Ornithologists and others would be interested and attracted, while tourism for bird watching; wild life viewing, forest-hiking and others touristic activities can be also expanded. It is default to value ecotourism, because tourists usually visit multiple sites upon reaching a country. However, a study on valuing ecotourism in Madagascar (Peter et.al, 1992); where natural preserves and their unique inhabitants are the primary attraction for tourists, the value per visitor is estimated about $360.

Non -Timber Products

The Yeki-Godera unique forest ecosystems produce many commercially valuable non-timber products. Primarily, wild coffee is collected as a non-timber forest product. The potential of wild coffee production as a means towards forest and biodiversity conservation in general and coffee genetic conservation specifically has received increasing attention. Wild coffee is defined as coffee that grows and regenerates spontaneously in its natural habitat and is generally different from known cultivars and landraces (DFSC and IPGRI 2001).

Recent initiatives have shown that wild coffee can attain high prices on the international specialty market by emphasizing its wild provenance. As witness, in 2003 a first initiative was started to market wild coffee in Germany as a certified authentic product. This initiative was followed by additional schemes for wild coffee as an environmentally friendly and socially responsible product. As a result of these initiatives, Ethiopian wild coffee has attracted trader's and consumer's attention in Europe as well as in the USA. For example in 2008, a total of 450 metric ton of wild 'Keffa' coffee was traded internationally and more than 2.22 Million USD was generated (MARD, 2009). Here "Wild Coffee" should not be confused with organic certificate, because there is no yet universally valid definition of wild coffee. It is obvious that all coffees of Ethiopia sold in the world market come in deed from genetically wild coffee population. To ensure that 'wild coffee' contributes to the conservation of the unique forest coffee ecosystem in a genuine sense explicit guidelines and standards (code of practices) concerning the management and marketing of wild coffee is necessary. These may include the ceiling of coffee population and production (per hectare) in order to avoid the conversion of the forest coffee into Semi- forest coffee. Other non timber forest products include; spices such as *Aframomum korarima* (Ethiopian cardamom), chilies, basilica, ginger, civet-perfume and honey which all have high potentials of export values through organic and/or specialty markets. Well planned unique forest ecosystem preservation, without isolating from traditional productive functions, has therefore significant potential for alleviating poverty of the indigenous forest inhabitants.

According to a study by J.P. Sutcliffe (2009) in the Southwest Ethiopia forest ecosystems, the values of non-timber forest products, is about $ 162 per hectare per annum. Based on this the loss of value in clearing, 1000 ha 3, 000 ha and/ or 5,000 hectare would be about $ 486,000 and $810,000 respectively. This is illustrated as per Suticliffe (2009) estimates in the following table 1.

Biodiversity-Coffee Gene Pool Values

Arabica coffee (*Coffea arabica*) has its centre of origin in Southwestern Ethiopia and, where it still occurs naturally in the undergrowth of the unique forest ecosystems. They are at high risk due to deforestation. This poses a massive threat to the

Table 1: Forest Clearing Vs Breakdowns of Losses in Monitory Values

Non Timber Forest Product	Value in USD per Annum			
	Per Hectare	Per 1000 Hectare	Per 3000 Hectare	Per 5000 Hectare
Wild coffee harvesting	4	4,000	12,000	20,000
Honey production	120	120,000	360,000	600,000
Miscellaneous forest goods	6	6,000	18,000	30,000
Medicinal Plants	32	32,000	96,000	160,000
Total	**162**	**162,000**	**486,000**	**810,000**

survival of the genetic resources of *Coffea arabica* – an invaluable genetic resource. As a result, the diversity of what was once around 5,000 coffee varieties, unique in the world, is in danger of being irretrievably lost (Heize et.al, 2006). The gene pool of these wild coffee populations is of national and international importance, because it has high potential for the breeding of new coffee varieties for future threats. These unique forest ecosystems are therefore of particularly high conservation importance and have a significant economic values. Hein and Gatzweiler (2006) have estimated the total value of Ethiopia's coffee gene pool to be between US$ 1,458 million (5 % discount rate) and US$ 420 million (10 % discount rate). Hein and Gatzweiler also estimated costs and benefits comparing for a 30 years discounting period using 10 percent and 5 percent discount rates. The lower value of $ 420 million was taken here and divided by the number of hectares of high forest area of southwest Ethiopia that are within the ecological limits of (1,100 – 1,900 masl) for *C. arabica* and obtained a value of US$ 280 per hectare per year.

Key for Tomorrow's Cure- Medicinal Values

Like the majority of rural Ethiopian, the indigenous people of Sheko, Mejengir and Bench rely on traditional medicine, based largely on different species of plants, for their primary health care (personnel communication). On the other hand it is witnessed by many scientists that the majority of current plant-derived drugs were discovered by examining the traditional use of plants by the indigenous people who lived where the plants grew and flourished. The Yeki-Godera unique forest ecosystem and its immense undiscovered biodiversity and the indigenous knowledge of the Sheko, Mejengir and Bench communities therefore hold the key to unlocking tomorrow's cures for devastating diseases. For instance as per key informants' traditionally:

- Fluids from the bark of *Albezia gummifera* are used for healing fire burns
- Young leaves of *Erythrina abyssinica* are used against fungus ,
- Bark, fruit and leaves of *Acacia albida* used against headaches, cold and stomach aches
- Leaf of *Cordia africana* is used to protect wounds from infection and the wound heals fast.
- Young leaves of *Croton macrostachys* are used against fungus (ring worm) and leaves are used against intestinal diseases and worms for livestock.
- Seeds of *Millettia ferruguenia* used to stun fish and leaves are used against external parasites of livestock
- Bark of *Olea africana* is used as medicine for intestine problems, branch is used as tooth brush, and smokes from any part of the tree are used as aroma and fly control
- Barks of *Prunus africana* provide medicine for urinary disorders.

Thus, in the thousands of species of the plants that have not been analyzed are many more thousands of unknown plant chemicals. These plant chemicals may well help us in the ongoing struggle with constantly evolving infections and pathogens, including bacteria, viruses, and fungi, which cause serious diseases, including hepatitis, pneumonia, tuberculosis, and HIV, all of which are becoming more difficult to treat. There is general consensus among Pharmaceutical Scientists that if there is a cure for cancer and even AIDS, it will

Table 2: Monetary Estimate of Forest Service Values

Forest Service Type	Value in USD Per Hectare	Per 1000 Hectare	Per 3000 Hectare	Per 5000 Hectare
Climate regulation	223	223,000	669,000	1,115,000
Water supply	8	8,000	24,000	40,000
Erosion control and sediment retention	245	245,000	735,000	1,225,000
Soil formation	10	10,000	30,000	50,000
Water Treatment	87	87,000	261,000	435,000
Nutrient cycling	922	922,000	2,766,000	4,610,000
Food production	32	32,000	96,000	160,000
Row material	315	315,000	945,000	1,575,000
Recreation	112	112,000	336,000	560,000
Cultural	2	2,000	6,000	10,000
Total	**1,956**	**1,956,000**	**5,868,000**	**9,780,000**

(After Douglas J. Krieger 2008)

probably be found in the plant communities of the forest ecosystems (Leslie, 1994). As the forest disappears, the medicinal plants vanish with them. The preservation of these forests is a significant economic opportunity for the development of Ethiopia, which is far beyond monetary values.

DISCUSSION

Douglas J. Krieger (2001) has established monetary values for the very few ecosystem services of tropical forests and suggested that the many decisions about converting forest ecosystem to commercial farms (investment) should be made by comparing benefits of ecosystem services and costs. That is the decision to convert a forest ecosystem to coffee, tea plantation or to others should be based on a comparison of the expected monetary value of the investment and the costs associated with the ecosystem goods and services for gone as a result of conversion (clearing).

Adopting Douglas's theory to the Yek-Godera unique forest ecosystem; per hectare ecosystem service value is $1,956. The following table shows ranges of the estimated values of the forests and the values that the nation would loss by clearing 1,000, 3,000 and 5,000 hectare of the forest. (Table 2)

What is true is that more than 20,000 hectares of land are being available for each individual investor, often in long-term leases and giveaway prices (personal communication). And most of the Yeki-Godera unique forest ecosystem of Southwest Ethiopia is suffering from acute deforestation, which is not only affecting the ecosystem and the means of life of the local (indigenous) populations--and in particular hunter and gatherers--but is also having an impact on humanity as a whole through global climate change and the loss of biodiversity. It is not by accident that deforestation and biodiversity degradation is in progress. The reason is very simple that the government viewed the unique forest ecosystems as impediments to the prosperity of the national treasury, as these lands could otherwise be utilized as export revenue-yielding property. Tea, coffee, rubber and palm oil are among the major commercial crops that provide significant opportunities for investment. Since the land quality and characteristic of the Yeki-Godera forest is highly suitable for coffee, tea, rubber and palm oil, coupled with the undervaluation of the unique forest ecosystem as 'uncultivated', 'under-utilized' or remote area by

decision makers; make it the obvious target for the recent trends of expansion in agricultural foreign investments.

Of course within the Yeki-Godera forest ecosystem there are tract of coffee and tea estates that were established some four decades ago and Ethiopia produces some of the best export coffee as well as good-quality tea in these estates. Although tea and coffee are not new to the area, further developing tea and coffee estates in the Yeki-Godera forest ecosystem is a threat to what is considered an area of special ecological interest. Rubber and palm oil are also newly emerging potential crops, which are attracting private sector investment in export oriented production. In many areas, coffee, tea, rubber and palm oil plantations are taking over the natural habitat of endangered species such as *Wild Coffeea Arabica, Aningeria and Polyscia tree species.* Thus the habitat conversion from unique forest ecosystem to mono-cropping of coffee or tea, rubber and/or palm oil are indicating to have a devastating impact on the biodiversity resources, along with on the indigenous people and animals that depend on them.

As reputedly stated the Yeki-Godera forest ecosystem is rich in biodiversity and it is the world's birthplace of *Coffea arabica* that still harbors their last wild coffee populations. This alone makes the unique forest ecosystem an economically viable; since the variability in their tolerance towards diseases and drought reflects the high genetic diversity of the wild coffee populations where the world depends for future threats and promotion of genetic engineering. Ethiopian can benefit from royalties and patents emerging from *Wild Coffea Arabica.*

On the other hand, specialty coffee houses have become popular and specialty coffee market is booming. In year 2008, in the USA alone the Specialty coffee accounted for $13.65 billion in sales, one-third of the USA's $40 billion coffee industry and the sales growth for the specialty segment projection was estimated to reach $18 billion in year 2012(SCAA: Specialty Coffee Association of America,2009). Recently, there has been also a huge surge in Specialty coffee demand from large, emerging markets including China, Russia, Brazil and India. These countries have growing middle classes which been providing high demand for good coffee and they are competing with the United States and Europe to purchase specialty coffee beans. The Yeki-Godera unique forest ecosystem is the unbeatable producer of the most natural forms of *'Unique Speciality*" coffee i.e. '*Wild Coffee'* which is only available in the world that can fetch the highest premiums in USA and in Europe as well as in China and Russia markets. The issue here is that with these glaring market opportunities why do we then destroy the unique forest ecosystem that harbours wild *Coffea arabica*? Why are we not dedicating a significant amount of attention not only to the fate of the unique forests ecosystem in the country, but also its effects on forest-dwelling indigenous peoples?

Comparison of the monetary value of the forest ecosystem with that of tea plantation also indicates that conserving the unique forest is more economical that of perennial cash plantations. That is with minimal management wild-coffee, honey, spices, civet, fruits and medicinal plants, and other renewable and sustainable resources can be harvested annually. In addition if we assume that at least 10 tourists visit the Yeki-Godera unique forest ecosystem per annum. This coupled with its ecological services will secure a financial return of about $6,000 per hectare per annum. This value provides an income not only today, but year after year - for generations. These sustainable resources - not the trees - are the true wealth of the unique forest ecosystem. While on average black tea productivity of a well managed tea plantation is about 1,250 kg/hectare (Kenya's experiences). Although there is no specific pattern to the price movements of tea in the world market, since world tea prices are volatile and fluctuate from month to month and from year to year, considering the 2010 highest world price for Top Kenya Tea Grade of black tea $3.74 per kg, the '*Gross*' financial return of tea plantation is about $4,675 per hectare per annum. Thus comparing the monetary value of preserving the forests to that of the wealth created by the tea plantations makes financial sense to invest in sound forestry management than expanding tea plantations. This should encourage greater government regulation on protection of large-tracks forest lands.

On the other hand, tea and other perennial cash crops have a great impact on the environment and they are never a substitute to the unique forest ecosystem in holding the soil. In a multistory forest ecosystem canopy helps slow down the fury

of the rains. And when the raindrops finally come down, it is slowed down further by undergrowth and grass. Flow of water does not get to carry much of top-soil with its current. Tea or rubber and/or palm oil plantations don't have such capacity; lot of top soil gets eroded each year with the rains, resulting in reduced soil fertility. Due to this, they have to be planted and produced on terraces which combines with the ground cover provided by plants that results in relatively good soil and water conservation. For example a research conducted in Kenya (Alfred, 2006) shows that in the 1st year after establishment of tea plantation, soil losses by erosion were 168 ton /ha. In the 2nd year soil loss were up to 81 ton/ ha, whereas in the 3rd year soil losses were 7 ton/ ha. Conversely, terracing is not mandatory for any investor wishing to obtain a license to produce these perennial cash crops (The Rural Land Administration and Land Use Proclamation No. 456/2005, mandates terrace construction for only annual crops (small holders) not for perennial estate farms (Article 13:4,5 and 6). Since terracing is costly to construct, investors would be reluctant to construct it.

The other further cause of deforestation especially in tea production is the use of wood for drying the tea leaves. As witnessed in Ethiopia, the tea factories of Wiswish and Gummero have contributed to deforestation. In order to fuel tea processing they have converted the natural forest to eucalyptus fuel plantations at 1 hectare of wood to 3 hectares of tea produced). This is not however an inevitable outcome. Other fuels such as oil and gas can be used in the drying process rather than cutting down natural forests. But wood fuel energy for processing of green tea is viewed as the best option due to its cheap price, availability as a local resource and reduction of foreign exchange in the purchase and transportation of gas and oil. In addition to the direct environmental impact of clearing natural habitats for tea production and processing, there are also the indirect effects arising from the development of tea in a forest area. Tea is among the most labor-intensive of all the plantation crops. It has both an agricultural and a manufacturing dimension; it would require substantial number of workers, giving direct employment opportunities to about 3,000 workers per 1,000 hectare of tea estate and at least another 1,000 are in indirect, tea-related employment (B.Sivaram,1996). Jobs and income generating opportunities draw in new settlers with the attendant risks of encroachment into surrounding forests.

Much can be said for the preservations of the remnant Yeki-Godera unique forest ecosystem that contains wild trees of *Coffea arabica*. But when decisions are made to encourage investment and alter natural forest ecosystem, little thought is given to the consequences that change may have on the unique forest ecosystem? Perhaps the most important push factor is the poor economic performance of other development sectors of the nation. That is low foreign exchange earnings from other sectors such as from industrial products; irrigated crop production and tourism coupled with in-desperate need of revenue (foreign 'hard' currency) pushes the country to devote these forest resources for commercial farming investments. It seems that because of this push factor, the investment legislation privileges and invites foreign investors. The intent is that (1) the government is highly interested in foreign capital to produce export crops for marketing products internationally, with better product design, quality characteristics, and brand names and hence increases the country's foreign earnings. (2) The government believes that foreign investments brings and transfer the latest technologies (3) It is believed that foreign investment helps in the economic development of the country in general and the area where the investment is being made in particular. (4) It is also perceived that foreign investment shield risks of economic hardship.

However the issues of foreign investment are controversial. Concerns include (1) There are loss of control over economic decision-making that may lead to conflict with government policy or public wishes (food self sufficiency vis-à-vis export crop production). (2) Unfair advantages over local competition, exploit government incentives at the expense of taxpayers, exploit critical national and natural resources, and move out of the country when their exploitation is finished.

From the above arguments, it appears that some of the underlying causes of deforestation and degradation of the unique forest ecosystem are derived by externals (foreign investors), who can profit from the weak economic situation of the country. Obviously not all the underlying causes are of external actors. There are also internal causes and to a great measure the responsibility

falls in this case on the Ministry of Agriculture (MoA) who is designated as lead agency for allocation of larger track of forest lands to investors.

CONCLUSION

There is enormous pressure on the Yeki-Godera unique forest ecosystems for the expansion of commercial farming, such as coffee, tea, palm oil and rubber. This presents economic conflict interests of the different stakeholders and threats, including the interest of the government to lease considerable areas of the forest for establishment of large estates of tea and rubber plantations. On the other hand the presences of huge potential for timber production in the high forest areas are very much attractive to various investment endeavors. Investors can make huge profits by selling timber only from the forest, and may leave the areas without implementation of their proposed projects. The issues are therefore; do we have considered the long range effects on the environment, climate change and habitat destruction of the ecosystems after the magnificent unique forest ecosystem of Southwest Ethiopia is destroyed and clear? Considerable portion of the forest ecosystem has already been destroyed. How many more hectares of virgin forest that harbors wild coffee population and other valuable species will be destroyed for the export crop production cause? It seems that Ethiopia now cares more about revenues from export products, but has little regard for its ecologically and economical viable of the remnant unique forest ecosystems.

It implies that the forest genetic resources, medicinal values and services are not considered as part of the national economy of the country, nor as elements of the learning economy. It is now widely accepted that forests are ecosystems, which besides producing timber, seeds and a few other marketable non-wood products, also produce ecological services that provide benefits to society in general and the economic sub-system in particular. These forest services's can only be maintained and further developed on the condition that the unique forest ecosystem is designated as '*UNESCO Biosphere Reserve'.* Like other biosphere reserves, where the core aim is biodiversity protection, and buffer zones in which sustainable practices are allowed. Meanwhile the unique forest ecosystems need attention from everyone, at this stage more than ever before. They need a green movement, not a pitch of black movement. Policy makers and planners must therefore extend their concerns and interests beyond perennial export cash crop production and end the "practices and projects which would contribute either directly or indirectly to further biodiversity losses of the Unique Forest Ecosystems of Southwest Ethiopia".

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