
The role of traditional land use systems in the well-being of rural Timor-Leste

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Abstract

Natural ecosystems and traditional land use systems have an important role in the life and well being of the rural population of Timor-Leste. The land itself is the support of natural ecosystems and subsistence agriculture of rural populations of East Timor and is the main focus of this research. This paper is part of work in progress. Our research, located in rural Timor-Leste focuses on land tenure, rural family income and the mechanisms that will induce changes in the rules of traditional society organisation.

The main objectives of this paper are: 1) to identify the different land use patterns of Timor-Leste; 2) to identify the goods and services produced by them and 3) to relate the services produced by land use patterns with the well-being of Timor-Leste rural population. This paper is based on a multidisciplinary approach incorporating contributions from several fields of knowledge, and uses documentary sources, direct observations made in various periods in the field and interviews conducted in 2003, 2009 and 2010.

We identify as the main land use patterns in Timor-Leste the following ones: natural and semi-natural ecosystems, subsistence agriculture, sacred, housing and basic infrastructures and Industries and services. For Timor-Leste rural communities the above land use patterns produce a set of goods and services, which can be classified as supporting, provisioning, regulating and cultural goods and services, and those are essential for their survival and well-being.

The conceptual framework used to examine the above mentioned issues is the human rights approach to development within which human rights are considered as means and objectives of development as much as economic purposes.

Key-words: Timor-Leste, land use patterns, ecosystems goods and services, well-being.

JEL CLASSIFICATION: Q15, Q23, Q24, Q26, Q57

1. Introduction

Land and water are the main supporters of almost every ecosystem in earth, either natural or semi-natural, including the traditional land use systems developed by the human being. The multidimensions of the services supplied by different land uses are essential resources for the majority of the population of the developing countries. Besides the economic value associated with those services, land services have also historical, cultural and sacred values that should not be ignored once they have shaped the social organization of communities over time. In this perspective, land as the most important natural resource should not be viewed or analysed in isolation but in its natural, social, economic and cultural context.

To recognize the multidimensional character of the services provided by nature in general, and land in particular, is the essence of a human rights approach to development. According to the United Nations Organization (UN), a human-rights based approach to development is a conceptual framework for the process of human development that is normatively based on international human rights standards and operationally directed to promoting and protecting human rights. In its essence, a rights-based approach integrates the norms, standards and principles of the international human rights system into the plans, policies and processes of

development. In other words, in a human rights-based approach to development, human rights are simultaneously the means and the goals of development.

The above mentioned standards can be found in the Universal Declaration on Human Rights (UDHR) that was adopted by the General Assembly of the United Nations in 1948 and in both the International Covenant on Economic, Social and Cultural Rights (ICESCR) and the International Covenant on Civil and Political Rights (ICCPR), adopted by the General Assembly of the United Nations in 1966. The ICESCR throughout its thirty one articles establishes a set of rights based on the peremptory obligation of guaranteeing all individuals the satisfaction of the needs without which human life with dignity would not be possible. In short economic, social and cultural rights concern for example the right of everyone to an adequate standard of living for themselves and their family, including adequate food, clothing and housing, and to the continuous improvement of living conditions; the right to work; the right of everyone to the enjoyment of the highest attainable standard of physical and mental health, to progressively free education and finally the right to social security by means of protection schemes in illness and old age, and the right to take part in cultural life for instance. The ICCPR, in turn, commits its parties, throughout its fifty three articles, to respect the civil and political rights of individuals, including the right to life, freedom of speech, freedom of religion, freedom of assembly, electoral rights and rights to due process and a fair trial.

One of the crucial features of human rights is that, being indivisible, in other words each rights value being intrinsically equal, it is not possible, nor indeed acceptable, that rights should be taken on a hierarchical basis. This means that if the services provided by nature are taken as rights each one is as important as the other to the well being and the fulfilment of the development goal. Development becomes, consequently, the result of a conjugation of material, political, cultural and spiritual values, none being dismissible in favour of the others. Development demands therefore the production of a growing quantity of goods as much as nurturing identity and freedom.

In practical terms a human rights approach to development implies that, as far as possible, one part of the overall development goal cannot be achieved in detriment of the other. Let us take into consideration that a resource can be used for economic and spiritual purposes for example. If the former prevents the latter, then one should not consider the benefits of its use only as adding positively to people's well being. Indeed, in this case one must take into account both the utility of the resource exploitation for economic purposes and the disutility of the loss of the resource for other uses. Here the concept of opportunity cost is extended to other domains beyond economic cost-benefit analysis. That is why it is of the utmost importance not only to identify all the possible uses for natural resources but also all the conflicting uses.

In our work, specific emphasis will be placed on the relationship between well-being and land, through physical, economic, social and cultural connections. The involvement of people with land also includes aspects of land tenure and natural resource management. The objective is to illuminate the role of land to simultaneously improve human well-being and sustain vital ecosystems in Timor-Leste.

Timor-Leste (The Democratic Republic of East Timor), the world's newest country, had in 2005 an estimated population of 994,500, half of which were female and two thirds were less than 25 years old. The population is growing rapidly and the fertility rate (7 children per woman) is nearly the highest in the world. Life expectancy is low, infant mortality is high,

utilisation rates of health services are low, and school repeat and dropout rates are high. Demographic projections, indicate that the Timorese population should increase by one-third by 2015 from its initial 2005 value, by four-fifths by 2025, and triple by 2050. The population will age, but only slightly, with 40 percent still younger than age 15 by 2025. The urban population, now about one-quarter of the total, is growing much faster than the rural population (World Bank 2008).

Timor-Leste society is mainly organised in a patriarchal, patrilineal and patrilocal clan system that is historically unfavourable to women's rights. The social order of East Timor is very marked by the cosmology and the dual nature of it. This is reflected in the social organization in which a sophisticated exchanging system plays a central role (Traube 1986, Fox 1980 and others). Gender inequality is present in a wide range of social practices, with the result that women have less access to natural resources, especially land, and a lower participation in decision-making processes.

The population is distributed in 2,300 villages and divided into 34 ethno linguistic groups. The majority of the population lives in rural areas (73.5 per cent), draws its livelihood from subsistence agriculture and is poor with a low standard of living.

The country subscribes plans of rural development to alleviate poverty. Since the majority of the population of Timor-Leste lives in rural areas, land is fundamental to meet basic needs and is central to their livelihood strategies. The achievement of the eight MDG in Timor-Leste depends heavily on healthy ecosystems and sustainable management of land, in special for four of the eight MDG for which land is a crucial element: 1°reducing hunger; 3°reducing child mortality; 6°combating diseases; and 7°ensuring environmental sustainability.

The ecosystems features described above apply to the land use patterns of Timor-Leste. The goods and services produced can contribute to more than one constituent of the well-being, and are valued in different ways by different peoples. For example, in Timor, rural and urban people prioritise different environmental issues. In rural areas, people are particularly concerned with secure access to and the quality of natural resources (in special land and water). In urban areas, people sanitation, waste removal and drainage are the key concerns.

As in many other parts of the world, poor people in Timor-Leste are the most vulnerable and severely affected when the environment is degraded or their access to natural resources, namely land, is limited or denied. Poor people have limited assets and are dependent on common pool property resources for their livelihoods once a big share of their incomes derives from them and often is the only source of income in rural areas.

The main purpose of this paper is in first place to identify the main land use patterns of Timor-Leste. Then, for four of the land use patterns identified, to describe the flow of goods and services produced and relate them to the well-being of the population. This research recognizes the essential role that land performs in the development of rural areas of Timor-Leste and the importance of focussing and keeping in mind the goods and services that land provides when dealing with a wide range of issues. Emphasis is given to the role that land can have to achieve a higher level of well-being and a more fair and equitable society.

2. Ecosystem Services and Development

Ecosystem services are the benefits provided by ecosystems that contribute to making human life both possible and worth living. This includes human use of products from forests, wetland and so on, and the services ecosystems perform that are used and valued by human societies such as cultural services, nutrients and water cycling, soil formation and retention, resistance against invasive species, pollination of plants and regulation of climate. These overall goods and services supplied can be aggregated in different classifications schemes. For example, the Millennium Ecosystems Assessment (MEA) aggregates them in four categories such as provisioning, regulating, cultural and supporting, while De Groot uses five categories being regulation, habitat, production, information and carrier (MEA 2003 and De Groot 2006).

Humans influence and are influenced by ecosystems through complex and multiple interacting pathways. The MEA makes clear the inextricable linkage between natural systems and human well-being. Well-being is an inclusive concept, in its broadest sense human well-being refers to everything important to peoples' lives, ranging from basic elements required for human survival (food, water, shelter) to the highest level achievement of personal goals and spiritual fulfilment. According to the MEA, the components of human well-being are security, basic material for a good life, health and good and social relations. These four elements contribute to an ultimate well-being benefit of "Freedom of choice and action", or "development as freedom" in Sen's words (MEA 2003 and Sen 2000).

Human well-being is dependent upon multiple and often interrelated ecosystems services contributing each of them to more than one component of well-being. Furthermore, the interconnectedness of the well-being components and ecosystem services are dynamic and context-dependent.

The linkages between ecosystem services and well-being or between poverty and the environment are established by relating the relevant constituents of well-being to the four services that ecosystems provide, e.g.:

- Being able to be adequately nourished: the provision of natural food are essential to improving diets, providing relief during times of famine, crop failure, pest attack and drought;
- Being able to have sufficient energy to warm and cook: the poor use firewood because it is cheaper than cleaner fuels and it has been freely available;
- Being able to have sufficient "clean water" to wash, cook and drink;
- Being able to use natural elements for traditional cultural and spiritual purposes.

The conceptual framework adopted by the MEA has human well-being and poverty reduction, at its core. Poverty is defined as the pronounced deprivation of well-being and has many different dimensions which reflect the multidimensions of the well-being (World Bank 2001). Human well-being and poverty reduction are dependent upon improving the management of Earth's ecosystems to ensure their conservation and sustainable use. Economic "development" that does not consider its impact on ecosystem services, may decrease the well-being of those vulnerable populations, even if other segments of society benefit from it, and so, it cannot be considered a path to true development. Combating the threat to the planet's natural capital should be seen as part of the fight against poverty and is the key to achieving all eight *Millennium Development Goals* (MDG)¹.

¹ Resolution adopted by the General Assembly. 55/2. United Nations Millennium Declaration. Fifty-fifth session, 18 September 2000, committing their nations to a new global partnership to reduce extreme poverty and setting out a series of time-bound targets - with a deadline of 2015 - that have become known as the Millennium Development Goals.

Some people are more vulnerable to the deterioration of natural ecosystems than others. People who does not have minimum standards of well-being, are generally the most vulnerable to the deterioration of natural systems. The rural poor in developing countries are often disproportionately affected, because they are more directly dependent on the resources and services that ecosystems provide. However, their voices have been largely absent from policy discussions and negotiations over environmental issues. The deterioration of natural ecosystems is likely to accentuate inequalities and marginalization of the most vulnerable groups.

3. Land use patterns in Timor-Leste

The land use patterns in Timor-Leste are profoundly marked by the topography of the territory, its geological origin, weather conditions and by human influence. The topography of the country is dramatic and varies from the Tatamailau Mount at 2960 meters, Cablac Mount at 2340 meters and Mata Bian Mount at 2370 meters to lowlands at sea level (Soeiro de Brito 1971). All those three mountains are close less than 20 Km from the sea. In overall terms 35% of land is above 500 meters, 44% of land is between 100 and 500 meters, and 21% of land is below 100 meters. On average almost half of Timor-Leste land has a slope of 40% or more (Mota 2002).

Timor-Leste Island is derived from limestone and metamorphosed marine clays which originated fragile, unproductive and low fertile soils. Weather conditions are tropical with a monsoon between October/November and March. The south coast also benefits from a small monsoon between May and June. In altitudes higher than 500 meters, the amount of rainfall doubles the annual average observed in lower altitudes, between 500 – 1500 mm in the North coast and between 1500-2000 mm in the south coast (Silva 1956).

Topography, soil fertility and weather conditions are the determinants of the cover vegetation of Timor-Leste. From an ecological point of view, land occupation in Timor can be divided in the following categories: mountainous areas; highland plains; moist lowland areas (along the southern coast); arid lowland areas (along the northern coast); marine and coastal areas; and, urban areas (RDTL 2005a).

Table 1 - Land use areas by category

	Area Hectares	%
Forest land		
Lowland	761,486	51.0
Highland, coastal & other	92,768	6.2
Agricultural land		
Estate crops	74,578	5.0
Food & other	336,400	22.5
Non-productive land	203,152	13.6
Cities, towns villages	19,934	1.3
Lakes	5,080	0.3
Total	1,493,398	100.0

Source: RDTL 2005a

Data available in Table 1, collected in the nineties, and possibly outdated nowadays, shows that forest land plus non-productive land plus lakes accounts for more than 71.1% of the total area of the country, agricultural land occupies around 27.5% and urban areas only 1.3%. However, MAFP estimates suggest that land suitable for agricultural production is around 600,000 hectares which should include the 203,152 hectares of abandoned land (RDTL 2005a; RDTL 2005c).

The vast majority of agricultural land is used for traditional agriculture, which forms the basis of livelihood of most rural households in Timor-Leste. The area of estate crops is mainly dominated by the coffee plantations of arabica in the highlands and robusta in lowlands and coconut trees.

From an anthropogenic point of view, the existence of different land use patterns in a given territory can be viewed in terms of the importance of the goods and services that are produced to satisfy human needs, either in terms of basic or luxury goods and services. Each one of the patterns observed not only corresponds to different uses given by the population but also to different intensities of human manipulation of the original ecosystems. The comparison between land for urban use and land for subsistence agriculture is very illustrative of the degree of changes that can occur in the original ecosystems, with a permanent conversion of the original ecosystem in the first case.

The manipulation by man of the natural ecosystem of Timor-Leste started some 40,000 years ago, continued with the Portuguese arrival at Lifau at the beginning of the sixteenth century and was dramatically accelerated during the 24 years of Indonesian occupation of the territory. The principal modification in Timor-Leste land use patterns due to the Portuguese presence or colonization was the intensive exploitation of sandalwood until its almost extinction, in terms of natural regeneration, in the nineteenth century. The almost extinction of sandal coincided with the introduction of coffee production, meaning that the sandal economic cycle was succeeded by the coffee economic cycle.

The Indonesian occupation of the territory in 1975 was characterized by a dramatic deforestation, principally of the remaining sandalwood, the few trees that were still preserved until 1975, and of other commercial timber species. Gusmão (2003) reports that during the Indonesian occupation, because Timorese guerrillas were based in forests, reforestation programs were suspended due to security issues and crop production was encouraged through opening new fields in forest land without using any practices of soil conservation.

Combining all the aspects mentioned and the peculiarities of the country into analysis, Timor-Leste, Table 2 indicates the main land use patterns and the most common uses that were considered relevant to analyze the relation between the set of goods and services that each land use pattern produces and the well-being of the people of Timor-Leste.

The first two types of land use pattern, already mentioned above, occupy the majority of the land of Timor-Leste. The natural and semi-natural ecosystems land pattern is utilized for primary and secondary forests, streams and lakes and coastal areas, while the land pattern of subsistence agriculture includes land for staple food crops, cash crops, livestock and fish ponds.

Table 2 - Land use patterns in Timor-Leste

Land use patterns	Uses
Natural and semi-natural ecosystems	Primary and secondary forests, streams and lakes and coastal areas
Subsistence agriculture	Staple food crops, cash crops, natural pastures, livestock and fish ponds
Sacred	Sacred houses, altars, forests and water sources
Housing	Urban and rural housing
Basic infrastructures	Churches, schools, hospitals, roads and public services
Industries and services	Industrial and commercial activities

The third type, sacred land, used for sacred houses, altars, forests and water sources, is very important in Timor-Leste not in terms of producing materials or area occupied but in terms of the intangible good that produces.

Land for housing is essential to consider because it provides shelter for the households and housing conditions sharply influence the level of well-being. On the same line of thought is the land use for basic infrastructure, such as churches, schools, hospitals, roads and public services. Considering Timor-Leste recent history, principally the destruction of houses and basic infrastructures occurred after 1999 referendum, present and future well-being will be dependent upon the reconstruction, and in the case of basic infrastructures on the quantity and quality of the public goods supplied to the population.

The subsoil off-shore, near-shore and onshore is rich on petroleum resources, being the off-shore resources in exploitation nowadays. Besides the exploitation of the oil reserves on-shore and near-shore, there is potential for minerals production, mainly copper and the associated gold and silver, and there are occurrences of chromite, bentonites, manganese, phosphate, gypsum, limestone, clay, sand, gravel and marble whose exploitation can be feasible in the future.

The impact of some drivers of change of land use, such as population, market pressure and the effect of economic growth, that are already on place, will result in an increase of land use for commercial agriculture, industries and services. The majority of these land uses will demand a significant manipulation of natural and semi-natural ecosystems, and often involve a permanent conversion of the original ecosystem.

4. Services of land use patterns and the well-being of rural Timor-Leste

The functions or services of land use patterns are the capacity of each different land use patterns to provide, direct or indirectly, goods and services that satisfy human needs. The goods and services produced are aggregated in this study in the four categories defined by the MEA: supporting, provisioning, regulating and cultural (MEA 2003).

The goods and services produced satisfy direct and indirect human needs contributing for the well-being of rural populations in the dimensions expressed in the MEA security, basic material for good life, health, good social relations and freedom of choice and action (MEA 2003).

4.1. Natural and semi natural

Natural and semi natural land use pattern includes the following land uses: primary and secondary forests, streams and lakes and coastal areas. According to Table 1, more than half of Timor-Leste (57.5 %) is covered by natural and semi natural ecosystems, mainly forests in lowland (51%), forests in highland, coastal and other areas (6.2%) and lakes (0.3 %) in a total of 859,334 hectares. Ruy Cinatti (1950a) classified the forest communities of Timor-Leste as mangrove, littoral, primary forest and secondary forest and savannah. The estimates of the area of primary forest are around 1.4 % of total area (Reis 2000).

In the past, Timor-Leste was well endowed with natural forests and in the middle age was known by Portuguese navigators that arrived to its coasts as the land of sandalwood. When the Portuguese arrived to Timor-Leste a prosperous commerce of sandalwood was already in place with South East Asia countries such as China. There is evidence that sandalwood has been harvested from Timor-Leste for about 1,000 years. In those times when the population was lower, shifting cultivation in the forests was the traditional and a sustainable land management system.

With the population increase and the exploitation of its forests during the colonial period, the area of forests have been reduced in its extent and in its condition, partly through clearing for agricultural purposes and partly through uncontrolled timber harvesting. Recent evidence suggests that there has been in recent times further degradation and over harvesting of forests, and that much of the land that was classified as forest was actually grassland, savannah or secondary forest. An estimate for the period between 1972 and 1999, which roughly coincides with Indonesian occupation, indicates that 114,000 hectares of dense forest and 78,000 hectares of sparse forest were lost (NDFWR 2004).

The sector investment program for natural resources and environment (RDTL 2005a) and NDFWR (2004) suggest a very simplified grouping of the main natural forest types of Timor-Leste: the savannah formations dominated by white eucalyptus (*Eucalyptus alba*) and tamarind trees (*Tamarindus indicus*) located mainly in the northern part of the country; open or moderately dense forest dominated by black eucalyptus (*Eucalyptus urophylla*) associated with several other species such as ferns located on the mountainous areas; and tropical monsoon forest carrying a mixture of species, some with timber production potential, in which the most important are sandalwood (*Santalum album*), *Ai Kiar* (*Canarium reidentalia*), red cedar (*Toona sureni*), redwood (*Ptedocarpus indicus*) and teak (*Tectonia grandis*) located in the eastern and southern part of the country.

As Timor-Leste is an island, the coastal areas are an important part of the territory in social and economic terms but are also very fragile ecosystems. The available information suggests that the coastal zone resources are largely unspoiled, compared to other countries in the region. It is worth noting that part of the territory of Timor-Leste, eastern littoral area lies within the Coral Triangle, an area with the greatest biodiversity of coral and reef fish in the world (BirdLife International 2010).

The coastal ecosystems are those ecosystems which lie within the coastal zone such as coral reefs, seaweed and sea grass beds, beaches and seashores. The seashores include the beach forests of mangrove and also river and lakes estuaries. The populations of these areas are composed by aquatic plants, invertebrates, fish, bats, water birds, amphibians and reptiles. The surrounding sea areas are inhabited by populations of many species of fish, including tuna, skipjack, mackerel and snapper that have high economic value. The north coast sea is

also host to large seasonal populations of whales and dolphins that migrate to the Pacific Ocean.

Natural and semi natural ecosystems contain several species of palm trees, eight species of bamboo, four species of rattan and are house for reptiles (crocodiles, snakes and lizards), mammals (deer, wild pigs, cusus and monkeys) and birds species (lorikeets, land and sea eagles and pigeons). Some of these fauna species are endangered and one of them is a lorikeet (*Philemon Inornatus*) a colourful parrot, once very common in the Timorese forests. At least seventeen of the wild species are commonly hunted such as deer (*Rusa timorensis*), wild pig (*Pork sp*), wild buffalo (*Bos Savanicus*), cuscus (*Phalenger orientalis*), and laco (*Paradoxurus hermaphrodites* or *mussanga*). Hunting is practiced throughout the year and uses traditional methods such as spear, dog, bow and arrow and trap (NDFWR 2004 and Gusmão 2003).

Timor-Leste forests produce a set of direct goods and services that have been harvested by its population since remote times and a set of indirect services. As described below, these goods and services can be framed in the four categories of services: supporting, provisioning, regulating and cultural.

The most important product has been timber from the various species cited: sandalwood, redwood, red cedar, teak and white and black eucalyptus. Regarding non timber products the most important are: fuel wood, rattan, bamboo, palm tree building materials, medicinal plants, honey, bee wax, palm flour, palm wine, wild fruits and plants (betel nuts, mushrooms, tamarinds, roots, tubers, sprouts, leaves and flowers), and animals for meat (deers, monkeys, birds, marsupials), materials for handicrafts and jewellery, fodder for animals and fertilizers to agriculture. All these products are included in the provisioning function.

Timor-Leste forests are the center of origin of two important species, sandalwood and *Eucalyptus urophylla* that represent a source of germplasm of major international significance. The *Eucalyptus urophylla*, one of the few eucalypts not indigenous to Australia, has been used to obtain hybrids that are the basis for pulp and paper industry. In the past, seed collecting expeditions were in Timor-Leste, nevertheless today there is inadequate knowledge of native stands, their location, conservation status and long-term security (Old et al 2003).

Regarding the several indirect services supplied by Timor-Leste forests the relevant ones are: protection of watersheds and flood regulation; soil formation, stabilization of soil cover and erosion control; control of waste degradation; water purification and supply of water for domestic consumption and agricultural irrigation; waste treatment; nutrient cycling; primary production; and shelter and nursery for the species of wild fauna and flora of East Timor. The beds of rivers and streams provide sand and gravel. All these services are mostly included in the regulating and supporting services.

With respect to the cultural role that the forest plays for the East Timorese, the reading of parts of the poem *Velhas Florestas de Agora* or *The Old Forests of Nowadays*, written by the East Timorese linguist and poet Fernando Sylvan, helps us to fully understand the cultural values that the East Timorese give to their forests.

...	...	
A paz da casuarina	The peace of casuarinas (beefwood)	
A flor do cafeeiro	The coffee flower	
...	...	
O estilo dos bambus	The bamboo style	
Os laços dos cipós	The lassos of lianas	
Os ecos dos toques	The echoes of lizards	
O riso dos macacos	The laughter of monkeys	
O salto dos veados	The leap of deer	
O canto dos loricos	The singing of birds	
...	...	
As florestas serviam	The forest served	
Desde séculos e séculos	For centuries	
Como templo sagrado	As a sacred temple	
...	...	
E ainda servem agora	And it still serves	
A heróis guerrilheiros	To warrior heroes	
Como templo sagrado	As a sacred temple	
De rezar liberdade	To pray for freedom	(Sylvan 1981).

In sum it can be said that the cultural role of forests is aesthetic, spiritual, educational and recreational, which if joined together and managed in a sustainable way could have high eco-touristic values.

The main products and services produced by the natural and semi natural ecosystems of the coastal areas are fish and aquatic plants and recreational activities connected to diving. The majority of the fish captures in the coastal areas are made with traditional fishing techniques and canoes, which at a first glance does not pose sustainability problems. Traditional fishing is an important activity for most coastal communities because it provides an important source of protein and is also a source of income.

Well-being

For most of the products and services produced by the natural and semi natural ecosystems, the data available to measure the income generated or the quantity of the goods produced is scarce or non-existent.

In the past, the most valuable specie was sandalwood that was almost totally harvested in an unsustainable way. Sandalwood is used to extract oil, famous for its fragrance. The fragrance of the hillsides of the north coast of East Timor, covered by forests of sandal, was referred by Portuguese navigators when arriving to East Timor. The 16th century Portuguese poet that chanted the Portuguese epopee of maritime discoveries, Luis de Camões, wrote in his master piece of poetry "*Lusíadas*"

Ali também Timor que o lenho manda	Over there is Timor, where the forest of
Sândalo salutífero e cheiroso	Salutary and scented sandal reigns
	(Camões, Canto X, 134)

Nowadays there are few occurrences of sandal in the districts of Covalima, Lautem, Oecusse and Bobonaro and in the house gardens of Dili which means that the income from this source is very small, exception for illegal harvesting. In some areas of Bobanaro, the sandalwood is a

sacred tree which has helped, in a certain extent to its preservation. The island of Timor is the center of origin of the sandalwood tree and an important source of genetic resources and biodiversity that is internationally valued.

The other timber species - redwood, red cedar and teak- are important sources of materials for local manufacturing industries and for exports. From these species, teak is the one that has a greater area, around 3500-4500 hectares. Teak is not native of Timor-Leste and was introduced with success 100 years ago. Given the reduced areas of these timber species, it appears that income from timber production only will be available in the future in a consistent manner, 20 to 40 years from now, if new plantations are made. Due to lack of transparency of timber markets, domestic market prices are below international prices, leading to the use of fine timber, with exporting value, for domestic uses that were better suited with other timber types. Manufacturing industries of furniture use also rattan and bamboo.

Forest as a supplier of building materials provides income for households and materials for the family houses. The main suppliers are the above timber species and bamboos for beams, black and white eucalypt for poles, and palm tree materials and bamboos for walls, fences and roofs. The beds of streams and rivers supply the building and construction industry with gravel and sand materials through small scale enterprises.

Forests and coastal products provide important materials for the handicraft industry that in certain zones, like Maubara and Ataúro, is an important source of income for the households involved in its production.

The main energy supplier of Timor-Leste for domestic use is fuelwood harvested from its forests that accounts for 93% of energy consumed (NDFWR 2004). The estimate of fuelwood consumption is around 800,000 tonnes per year, which gives an average consumption per capita and day of 2.2 kilograms (RDTL 2005a). The main fuel wood suppliers are white and black eucalyptus. The harvested wood is used for self consumption and is also a source of income for many households located close to the main roads.

Timor-Leste forests and coastal areas are also a source of important food resources such as honey, palm flour, palm wine, betel nuts, mushroom, tamarinds, roots, tubers, sprouts, leaves, flowers, deer, wild pigs, monkeys, birds, marsupials, fish, shells, seaweeds. Some of these goods are sold in local markets, meaning that they are a source of income for the households that harvest them. The production of seaweeds in eastern coastal areas of Ataúro Island is used not only as food but also is sold for cosmetic and medicinal use.

Cinatti identified the plants and trees from the forests, savannah and meadows of Timor-Leste that can be used totally or partially for human consumption such as cereals, flours, fruits, legumes, sprouts, leaves, flowers, roots and tubers (Cinatti 1950a).

Forest vegetation is an important source of animal feeding and also of the organic matter necessary to do the mulching and organic fertilization. Both of these goods contribute to food production.

All the above forest resources contribute with income and or food for the constituent of the well-being called basic material for good life.

Plants and honey have been and are used to prevent, treat and cure diseases by the population of Timor-Leste. Moreira (1968) refers that, to the world, Timor was known by means of a medicinal plant, sandalwood, that in the middle age was in Europe almost exclusively used in medicine. The study of Frei Alberto de São Tomás (1969), Dominican missionary, made in the eighteen century and titled “Virtues of some plants on the island of Timor”, was the first study about the medicinal importance of plants of Timor-Leste for traditional medicine use. The data collected by Moreira (1968) are a guide to treat some diseases and the author points out that the knowledge of traditional healers “matan-dooc” is vast and secret and that medicinal plants are in many cases considered sacred or “lulic”. The recent studies of Collins et al. (2006; 2007) identifies a set of plants and trees used for medicinal purposes by different ethno linguist groups and points its importance for the military resistance against Indonesian occupation.

The data available on the distance and travel time needed by rural population to reach health facilities, about 30km and 60 minutes, show that in many cases the most viable alternative for the population is resorting to traditional medicine (DNE 2008). During our field missions was possible to confirm the importance of traditional medicine, the deep knowledge and wide practice of it by rural communities. This service is included in the health constituent of the well-being.

The cultural services have an important role in the security constituent of the well-being. For example, it has provided in the past, during the times of instability and fight against Indonesia, the places for refuge of the warrior heroes as suggested by Fernando Sylvan in his poem (Sylvan 1981). But it also contribute to the constituent of good social relations, due to the fact that spiritual, aesthetic, inspirational and educational values transmitted by natural and semi natural ecosystems can make an important contribution to the social and character development of human beings.

From an economic and social perspective, the recreational and ecotourism services, if properly managed, can be in the future an important source of income for households. Examples already in place are the eco resorts of Com, Ataúro and Jaco Island managed by local communities.

The creation of the national park Nino Konis Santana can be considered, an important measure to preserve the forest reserve of Loré and the costal ecosystems of Jaco island, and to induce sustainable recreation and ecotourism. Nino Konis Santana national park is habited for rare and threatened species including green sea turtles, dugongs and saltwater crocodiles. Particularly rich in bird life, it includes relatively large numbers of three globally threatened species of pigeon, plus the critically endangered yellow-crested cockatoo, one of the world's rarest birds whose populations have been devastated by trapping for trade as household pets (BirdLife International 2010).

From the indirect services that forests perform, the most important in the short run is water supply for domestic and agricultural irrigation use, assuring the access to a vital good and contributing to increase food production through irrigated crops. Both of these two services have a significant contribution for the constituent of the well-being basic material for good life.

Another important indirect service is waste treatment performed by natural and semi-natural ecosystems. Beyond the city of Díli, where there is formal system of collecting and disposing

waste, in the majority of the country waste is left in the hands of nature to be treated, and some ends up into the rivers and down to the sea. As an example, in many parts of the countryside people use water springs for domestic and hygiene use and in many of those springs the surroundings areas are full of empty plastic bags and detergents packages.

Regarding the other indirect services described above, they all contribute directly or indirectly to the constituent of the well-being named security, because will allow in the future a secure access to natural resources and will prevents the existence of disasters. However, if the annual soil loss, estimated to be 26 tons per hectare and per year (the world average is around 10 tons), and if the annual rate of deforestation, estimated to be around 1,1% per year loss of forests (four times the world average), are not reduced, the flow of goods and services that the natural and semi natural ecosystems still perform nowadays, will progressively decrease in the near future, with unpredictable consequences in ecological, economic and social aspects (Mota 2002). Loss of production capacity of agricultural land is observed in seven districts with an estimated annual loss of 279 hectares of rice land due to river intrusions and resulting to an approximate annual loss of paddy production of 80 561 USD (NDFWR 2004).

4.2. Subsistence Agriculture

Subsistence agriculture uses land to produce crop, livestock, and fishing activities. Farming systems in Timor-Leste are usually divided in upland and lowland, with the last one subdivided in North coast and South coast. The main difference between upland and lowland is altitude and rainfall while the amount of rainfall also differentiate North and South farming systems. Intercropping is used for maize, cassava and vegetables and shifting cultivation is still common in many parts of the country.

The most important food crops are coffee, maize, rice, cassava, beans, peas, peanuts, coconut, candlenut, cocoa, vanilla, sisal, fruits (banana, papaya, orange, mangoes, pineapple, tangerine, avocado, water melon), vegetables (sweet potatoes, yams, tomatoes, onions, pumpkins, cucumber, chu-chu) as shown Table 3. With exception of rice and coffee all the other crops are produced by the vast majority of households. The most important food crops are maize and cassava while the cash crops are mainly coffee and rice. Vegetables and fruits cultivated in the house garden, in addition to having a role in household supply of food, are often an important source of occasional income.

Table 3 – Number of families producing the different crop activities

Crops	Total Number of Households growing	Percentage of households growing
Rice	60966	31.3
Maize	131516	67.5
Cassava	134233	68.9
Vegetables	103779	53.2
Temporary fruits	124766	64.0
Permanent fruits	131854	67.6
Coffee	66679	34.2
Coconut	116562	59.8
Other Temporary Crops	118163	60.6
Other Permanent Crops	127569	65.4
Total Number of Households	194962	100.0

Source: DNE 2006

The majority of rural households own some type of livestock (Table 4). The most important livestock species are chickens and pigs presented in more than 70% of the total households. Sheep production is done by only 4.1% of households because production is restricted to Manatuto, Baucau and Viqueque districts. Buffalos are presented in 11.3 % of the households while horses, cattle and goats account for around 20% of the households. The average number of heads of livestock per household is low, but large cattle producers are found throughout the country.

Table 4 – Number of households producing the different livestock activities

Livestock Species	Total number of households with livestock	Total number of livestock (heads)	Percentage of households with livestock	Average number of livestock per household
Cattle	39713	133577	20.4	3.4
Buffalos	22127	95921	11.3	4.3
Horses	34314	63234	17.6	1.8
Pigs	140697	331895	72.2	2.4
Sheep	7897	38965	4.1	4.9
Goats	41902	126977	21.5	3.0
Chickens	141372	659066	72.5	4.7

Source: DNE 2006

The technologies used by subsistence agriculture are traditional with low modern input use. In many zones of Timor-Leste the maize traditional production technique is still used through clearing and burning the parcel of land, which makes a decisive contribution to deforestation and soil erosion. Buffalos and horses are used in the preparation of the soil in rice fields and horses are also valuable means of transportation for the populations located in areas of difficult access. The livestock feeding is done using the native pastures, crop and fallow land in which the animals are let loose (MED 2008).

Many households and villages have small ponds, introduced during Indonesian occupation, that produce fish that are used mainly for home consumption.

The agricultural activities from subsistence agriculture produce food that is mainly used for family consumption with the surpluses being sold at local market. The uses of land for subsistence agriculture provide mainly provisioning services such as food and fibre. However, some agricultural activities are directly related with natural and semi natural ecosystems and could produce other goods and services rather than the provisioning services. For example, coffee plantations with their shade trees are explored in a forestry system, that besides producing coffee, protects the soil and the watersheds and create a very pleasant landscape, contributing for the regulation and supporting services. On the opposite side, maize using a technology of slash and burning in many regions of Timor-Leste, produces indirectly a set of severe impacts that reduce significantly the regulation and supporting services of the ecosystems of subsistence agriculture.

Similar to natural and semi natural ecosystems, subsistence agriculture is also a supplier of fuel wood though the pruning of coffee and other trees.

Subsistence agriculture in Timor-Leste is also a source of genetic resources once many of the species used have an origin and are adapted to the region. Regarding genetic resources it is

worth to mention the hybrid of Timor. During the first half of the twenty century a fluke of nature created a hybrid that resulted from an unlikely cross between the arabica and robusta coffee species. After 1956, the hybrid of Timor was distributed by worldwide research institutes and has been a key element in the genetic improvement of the arabica species resistance to the *Hemilia Vastatric* rust.

Well-being

Subsistence agriculture is the main contributor for the well-being of the rural populations of Timor-Leste either in terms of food supply for family self consumption or cash income. The main cash activities are coffee, rice, vanilla and livestock animals and in a lesser extent the surpluses generated by fruits and vegetables activities.

Subsistence agriculture contributes decisively for the constituent of the well-being called basic material for good life. Food production for self consumption helps to satisfy a sufficient and nutritious diet while cash income creates conditions for access to manufactured and other goods such as radios and higher education for the household children. For the majority of the households, animals are valuable assets acting as a sort of monetary reserve, to help offset a crisis, the education of children and the fulfilment of social obligations of families such as weddings and funerals. This last task has an important role on the good social relation constituent. Both create conditions for families to have an adequate livelihood and contribute decisively for their freedom of choice and action.

Regarding coffee production in Timor-Leste, it is worth mentioning the special case of *Laco Ten*, as laco coffee is known in Timor-Leste. There is a pleasant and useful symbiosis between the laco (*Paradoxurus hermaphrodites* or *mussanga*) and coffee cherries. In the description of Sá laco is a sly, smart, slow, eye very much alive, hidden during the day and by night his meow perfectly imitates the cries of children. Laco is very friendly of the pulp of coffee cherries, feeds on them and leave the seeds on the plantations where they grow (Sá 1952). Processing the laco coffee seeds, produces the laco coffee, one of the most expensive world coffees. This symbiosis, if utilized properly, allows that laco populations be maintained in the wilderness and the creation of a laco coffee market that would increase farmers' income and laco's populations.

Subsistence agriculture is also an important source of fuel wood for household consumption and income principally through coffee pruning. The majority of the coffee plantations of Timor-Leste is old and need to be pruned and replaced. East Timorese coffee technician Mario Tavares defends that the income from wood of coffee pruning could be an important mean to finance the loss of farmers' income during the three years needed to do the substitution of old plants by new plants and a significant contribution to the supply of East Timor fuel wood (Tavares 2010).

The hybrid of Timor was created by nature in the mountains of Ermera, village of Mata Nova suco of Fato Bessi, in the first half of the twentieth century. The importance of this natural unlikely event should be utilized by the country to maintain the original hybrid trees, to implement a coffee museum to attract foreign visitors, to promote Timor-Leste coffee worldwide and to ask for Timor-Leste coffee production be considered world heritage. If all of these are done the well-being will be improved.

Subsistence agriculture and food production depends highly on the favourable weather conditions for agriculture, such as the amount of rainfall and the extent of the rainy season,

which cause, in some years, food shortages principally at the beginning of the rainy season. This could be illustrated by the proportion of population that is food insecure (poor food consumption and weak food access), 20%, and by the proportion of population highly vulnerable (insufficient food consumption and access), 23% (UNWFP 2006).

With good weather conditions for agriculture, the amount of available food can be enough to feed the households family but the proportion between the different components of diet is not equilibrated. Food insecurity and inadequate diet are threats to the ability to adequately nourished and thus to the health constituent of the well-being.

Food and cash income contributes also to reduce the vulnerability of the population to shocks and stress while the forestry system of coffee production contributes to reduce ecological disasters, both playing a role on the security constituent of the well-being.

The technologies used by subsistence agriculture are traditional with low use of inputs or improved seeds, fertilizers and plant protection products for crops, or concentrated foods and drugs for animals. Consequently, the productivity is low and the income generated as well, which will have a direct effect in the well-being of rural populations of Timor-Leste. However, subsistence agriculture is organic by default, which nowadays has brought a price premium for Timor coffee in the international markets. When one looks at income per day of labour force used in major crops, corn has 0.54 USD per day, rice 1.42 USD per day and coffee 6.12 USD per day, being coffee the only activity to have a labour remuneration similar to the others sectors of activity (Directorate of Agribusiness 2009).

The number of families with access to the most important agricultural cash income activities is less than half of the total households. For instance, the percentage of families that grow rice is 31.3, for coffee is 34.2, for cows is 20.4 and for buffalos is 11.3 (Tables 3 and 4). The data available does not allow identifying the families that have simultaneously two or more of those cash income activities. However, the wealthiest families growing coffee are located in the Ermera and Liquiçá districts, for rice in Baucau, Viqueque, for cattle Bobonaro and Oecusse and for buffalos Viqueque and Baucau. However, surprisingly, the data revealed by Rui Gomes (2009) at a conference in Dili, July 2009, shows that farmers living in the most profitable coffee-growing areas also have the highest level of poverty and malnutrition in the country.

The ability of a household to feed its family depends on several factors such the area available for each family and weather conditions. The average area per capita is 0.4 Ha, falling to 0.22 for the poorest and rising to over 1 Ha for the wealthiest. The average area per household is about 1.2 Ha and the vast majority of households have less than 2 Ha (UNDP 2006: 25). Although very unequal land ownership, formal or informal, is common throughout the country, and only 6% of the population have no land. (RDTLc).

Table 5 – Average income per household and day for maize, rice and green coffee

	Maize	Rice	Green coffee
Average yield levels (2004)	502	1846	185
Average area per Household (2004)	1.380	0.514	0.813
Average anual income per household (2008)	246	112	261
Average day income per household (2008)	0.67	0.31	0.72

Source: DNE 2006; Directorate of Agribusiness 2008; and authors

Regarding income obtained from the major crops, Table 5 shows the results of the average annual income per household, considering that outputs are sold at market prices, the average area per household and average yields levels observed in Timor. The income per household and year is higher for coffee and is followed by maize and rice while per day income of the household is 0.31 USD for rice, 0.67 USD for maize and 0.72 USD for coffee. If one compares these last values with the poverty line for Timor-Leste, 0.88 USD per capita and day, has a clear picture of the deprivation of well-being that Timor-Leste households have in the present (MF 2008).

4.3. Sacred land

One of the principal land use patterns observed in Timor-Leste, due to its value to the populations, is what we can designate as sacred land use pattern, meaning, in a simplistic way, the *lulic* occupation of land. The concept of *lulic*, which means holy or sacred is a force that can be simultaneous and paradoxically dangerous or favourable. As Cinatti (1965) describes it “A energia que atrai e repele, que mata e ressuscita...” / “The energy that attracts and repels, that kills and resurrects...”.

For most of the Timorese, land is the core of all spirituality and this relationship is central to the issues that are of great significance to daily life. For instance, Timor-Leste cosmology itself is inextricably bound to the perception that land is sacred.

It is worth noting the existence and the importance of nature spirits, such as *Rai Nains* (spirit owners of the land) and the *Bée Nains* (water lords). Nature spirits are spirits that inhabit or live in nature. These spirits are important because they help to protect people and to provide people with essential items like water and food. In order to guarantee the goodwill of these spirits, communities practice rituals and ceremonies that honour these spirits.

Sacred areas may vary from a few trees to a mountain range, and their boundaries may not be fixed. Ground considered as *lulic* is presented all over the country, from the sacred grooves of Lautem district to the sacred mountain known as Datoi in western Bobonaro border, from Bemalae lagoon (Bobonaro) to the Betel nut forest of Oecussi. However, there are no accurate data to estimate the area of *lulic* land. These spaces are characterised by their cultural status as sacred, taboos associated, rules of behaviour and local communities rules of management.

The sacred spaces/grounds have different uses such as sacred houses, land, forest, grooves, trees and water and altars associate with them, and there are also totemic species of animals (i.e. crocodile- *crocodylidae* and Toque-*platydactylus gottutus*) and plants, namely trees (i.e. *ficus*, either *spp.* or *benjamina L.* and *Tamarindus indica*).

Sacred sites have significant economic, social and cultural value among local communities. They contribute to the regulating services, for example, through conserving places around water sources or the forest that are ecologically useful to maintain water flows and avoid erosion. Many sacred sites are places from which many people derive their means of subsistence; they provide also basic goods, such as food and water, necessary to maintain the livelihoods of local people, thus contributing to the function of provision. But, more importantly, they maintain biological diversity (provisioning function as well) and provide goods for ritual and cultural purposes.

Cultural services can be considered the major contribution of the sacred land use pattern to the well-being, among other reasons because they have no easy substitutes, especially for rural and poor communities. An illustration of this huge value can be seen in the fact that the spiritual potency of the land is given as the main reason to return to homeland and as main advantage of living and working on one's own land (Bovensiepen 2009, p.326-328 and authors field notes).

Cultural services provided by sacred land provides key elements that are the founding pillars of the cosmology² and of the traditional society features such as land tenure, management rules of natural resources, marriage and settlement patterns.

As will be shown later, the “sacred house” represents the most important piece of the Timorese social structure, once it is the focal point of all life. Descendents groups, all members of the lineage refer to a common ancestor, are linked to “sacred houses”. The sacred house determines family alliances and settlement patterns.

In East Timor two kinship systems coexist, patrilineal and matrilineal, which are associated with two rules of residence, patrilocality and matrilocality, corresponding to two systems of land inheritance. In most rural areas dominates the patrilineal system, where land is passed according to the male line and only for sons. The exception is the matrilineal communities (belonging to groups Bunak and Tetun-Terik, no more than 12% of the population) where land is transferred through the female line.

Marriage plays a central role in the complex system of family alliances that form the structure of Timorese society. Ruy Cinatti et al (1987) stresses the importance of *barlaque* (bride's wealth or dowry) given the political, economic and social implications of the arrangements involved. In the genuine tradition, *barlaque* is an occasion in which exchanges occur between two families, and the bride -namely her fertility- is part of the deal, in keeping with Timorese cosmology, particularly as it relates to the ‘wife-giving’ and ‘wife-taking’ groups and to the notion of ‘flow of life’ (Fox 1980).

Customary land tenure is heavily dependent on the societal systems (matrilineal x patrilineal) and namely on settling pattern after marriages (matrilocal x matrilocal).

The community land is owned and managed by communities, according to customary law, by rules of social and cultural behaviour. Most of the land used by rural households belongs to this category. Inheritance (including inter vivo transfers within the family) and distribution based on customary law are the principal means by which land is acquired in Timor-Leste (World Bank 2003:73, also survey data collected by Narciso and Henriques in 2003).

Within the management rules of natural resources, *tara bandu* is worth to mention. According to Demetrio do Amaral de Carvalho from Haburas Foundation's and winner of the Goldman Prize in 2004 “*Tara Bandu* is an East Timor tradition, a customary law that we recognize as traditional ecological wisdom. It involves a kind of agreement within a community to protect a special area for a period of time“, usually prohibits the use of certain places as sacred areas, but is not exclusively applicable to sacred sites (Carvalho 2004). The prohibitions usually

² This is a set of myths, beliefs, knowledge, perceptions and modes of comprehension, which encompass elements of the ordinary and supernatural worlds, allowing for the interpretation of events and enabling the taking of decisions in everyday life. For the cosmological questions with regard to Timor, namely about Manbai, see Traube 1986).

apply to the harvest of agricultural production, cutting trees, collecting forest products and hunting or fishing. *Tara bandu* is a custom that regulates the relationship between humans and the environment surrounding them. Ritual prohibitions or *tara bandu* is widespread throughout Timor. However, the term used varies across Timor-Leste and its application is not uniform.

The customary systems, including customary land tenure, remain alive and strong showing its high degree of resilience. All the above features of social organisations in Timor-Leste are inextricably linked to the cosmology and the cosmology in turn is inextricably linked to the perception that land is sacred.

Furthermore, the sacred land use pattern produces, among others, a wide range of cultural services, which contribute to people's quality of life including: identity/sense of place/feelings of "being at home"; spiritual and religious values and enrichment; knowledge system and learning, education, and scientific opportunities; and aesthetic enjoyment and leisure and recreation. The purpose of this list, adapted from those in the MEA, is to provide a starting point for this reflection upon the importance of sacred places, services provided, and their implications for people in Timor-Leste.

In line with the above, sacred places in Timor-Leste provide a wide range of cultural service that are less tangible than material services and goods. Nonetheless such services are highly valued by all communities in Timor-Leste. Examples of these services are:

- The "affiliation" to a specific sacred house and its territory;
- The cultural diversity produced by the dynamic interaction between topography, biological diversity and people. More than 30 ethnic groups are dispersed in this half of tinny island;
- The traditional knowledge associated with sacred sites has been passed down from the ancestors and is learned through a process of initiation in order to gain a progressive understanding of customary law. The opportunity to learn about it is also an opportunity to learn about land uses, agricultural practice, land tenure rules and other related issues;
- The conservation of many places as forests, mountains and other geographical formations such as small natural ponds and associated unique biota, caves, and other particular landscapes have been protected and avoided from degradation and destruction due to the fact that the sites are sacred. The preservation of sacred sites should also be regarded as a means to conserve the habitat and non-sacred sites, including the various species they contain and its genetic resources.

As mentioned above, within the framework of sacred land use pattern special attention should be paid to the case of sacred houses, *Uma lulic*. As Trindade said "The importance of the *uma lulik* in relation to the people of East Timor cannot be overstated. The sacred house embodies the ethos of communal unity and the binding relationships between the people, the land and their ancestry..." (Castro 2007:38).

Austronesian houses, including Timorese sacred houses are well known in anthropological literature as being much more than mere shelters. They represent important social spaces and local cosmologies (Traube 1986); they link extended families and are therefore the prerequisite and guarantee of the "flow of life" (Fox 1980). Then, sacred houses are a key piece of all cultural service provide by land and namely to the "identity/sense of place/feelings of, being at home" and "spiritual enrichment".

“The *Uma Lulik* is both a sacred house (an actual place) and a metaphorical ‘sacred house’ in the sense of a broader spiritual and relational home an individual has in the world” (Castro 2007:19). The house is not possible without land, on which to build it, neither without spirituality.

Houses are pivotal to social organisation; they represent the social hierarchies and define marriage systems and forms of ritual exchange that reproduce Timorese society, including patterns of political leadership and power. McWilliam (2005) stresses the cultural significance of these houses as repositories of knowledge representing the moral order of society and its role as “houses of origin and alliance” and illustrates this idea with the case of clandestine resistance structures. Clandestine resistance structures were based on house-based affiliations of trust and duties between descendents and allies. Beside the social cohesion, house affiliation is very important to secure resource access and then to personal safety.

The rebuilding of sacred houses (many of them burnt in 1999) and the re-invigorating of ceremonial rituals around the countryside, which are practices that re-enforce the legitimacy of ancestral spirits, should be stressed. These reconstructions requires a huge effort of all members of the “house”, they must contribute with goods, like animals, rice or even cash, absorbing many resources and time, and are one of the very few justifications to sell land. The reconstruction of sacred houses is a prerequisite and symbol of collective post conflict identity work and can play a key role in the peace-building process. On the other hand these and other rituals are a mean of recognizing the marks left by years of conflict and by that, they make a contribution to overcome the traumas of Indonesian occupation and freedom fight, and thus improve mental health of people.

The ceremonies which take place in any sacred place are for the well-being of the people of that community, ensuring the fertility of their crops and livestock and providing protection and spiritual assistance for constituent households. Agricultural crops are the embodiment of ancestors and ceremonies are held throughout different cultivation phases (farming rituals, i.e. from dry to rainy season, the rituals that precedes the sowing, prohibitions on the harvest and from the rainy to dry season, the first harvests of maize and rice ceremonies). “With a common ancestry identified, ceremonies and ritual taking place in house re-affirm ties to ancestral generations, unify extended family members and bind them to each other and to the specific geographic territory associated with the house” (Castro 2007:19 and 20, citing McWilliam 2005: 32).

To be able to expression their faith and values, namely performing their traditional ceremonies in public demonstrations, increases the feeling of security and reduces people’s vulnerability. These performances can act also as tool to empower the people.

Well-being

Sacred places are closely linked to the security and good social relations constituents of well-being. Traditional practices linked to land services play an important role in developing social capital and enhancing social well-being, e.g. the loss of important ceremonial contributes to the weakening of social relations in a community. On the other hand, affiliation with an *Uma Lulik* is a safety network, for example, ensuring access to natural resources.

Sacred houses and other sacred places, like sacrificial shrines (sacrificial altar sites) and sacred water sources are one of the basis of the East Timorese social organization and determinants of the traditional social life and social cohesion. The sacred places provide also

basic material for a good life, such as food and water necessary to maintain the livelihoods of local people.

Regarding the health constituents of well-being, sacred land makes its contribution through the provisioning services as food production and plants used in popular medicine and regulating services, including those that influence the distribution of disease. Cultural services play also an important role through the contribution of recreational and spiritual benefits to the physical and mental health.

All these elements have important contribution to an ultimate well-being benefit of “freedom of choice and action”, even when they seem contradictory to it. Protecting sacred places in Timor-Leste is necessary for the strength of its culture, and could have a fundamental impact in its cultural identity and status as sovereign nation

4.4. Housing

Land provides a suitable substrate for infrastructures, including housing. Housing satisfies people's fundamental need for shelter. However, places of residence serve many other functions in satisfying human needs. Homes provide a place where people can enjoy privacy, a place to sleep and to eat, a safe place to keep possessions and so on.

The housing category provides space for urban and rural housing, i.e. shelter for people in urban and rural areas, space for houses with different shapes, dimensions and materials. Timor-Leste traditional housing architecture is very rich in terms of design and materials as shown by Cinatti et al. (1987). Figure 1 reproduces the main house profiles found in Timor-Leste, showing places of residence provide individuals with a key means for expressing their identity.

SINAIS	REGIÃO	PLANTAS E ALCADOS		ALTITUDE
	BONONARO			MONTANHA
	MAUBISSE			MONTANHA
	BAUCAU			COLINAS PLANALTO
	LAUTEM			COLINAS PLANALTO
	VIQUEQUE			PLANÍCIE
	SUAI			PLANÍCIE
	OCUSSI			PLANÍCIE

Figure 1 – Main profiles of Timor-Leste traditional houses
Source: Cinatti et al. 1987

The Census 2004 counts reveal that about 1.3 percent of all land in Timor-Leste is classified as urban. In 2004, just over 206,000 people, 22.3 percent of the population, lived in urban areas with Dili accounting for over 80% of the urban population.

There are many aspects of housing that are associated with individual well-being, among them whether or not occupants own their home and housing conditions. The Census 2004 shows that around 95 percent of the population lives in private homes owned either by themselves or family members with an average of 4.7 persons in each household. The majority of the rural population “own” their house and have secure tenure of it, even if it is in an informal way once a land law is not yet in force. Housing conditions are generally poor and there are huge disparities in access to services between urban and rural areas. About 50 percent of houses in urban areas have access to piped water supply, 58 percent to a private toilet and 74 percent to an electricity supply. Corresponding figures in rural areas are significantly lower, 40 percent, 14 percent, and 10 percent, respectively.

Estimates are that urban population will grow by an annual average rate varying between 5.0 and 5.2 percent to around 357,000 by 2015. Urban population estimates, drawn from the Census, suggest that there will be a demand for about 60,000 new housing units in urban areas in the period from 2004-2015 (RTDL 2005b).

Well-being

The housing use of land contributes to the basic material for a good life through the provision of living space, ranging from isolated houses to large urban areas. Housing is closely linked to “security” and “Basic material for good life” constituents of well-being. Regarding security, it

is worth noting that every human being has a right to adequate housing: “right of all to a secure place to live in peace and dignity”, a right “ensured to all persons irrespective of income or access to economic resources” (CESCR General Comment 4). An adequate shelter is also part of the “Basic material for good life”.

Housing is also linked with the health component since the housing conditions are health determinants. Poor housing conditions have a direct relationship with health problems such as respiratory diseases, accidents and mental illness. For example, the large number of lower respiratory infections in Timor-Leste, which are the 3rd cause of death in all ages (WHO 2006), are strongly linked to the exposure to indoor smoke from the firewood to cook. Diseases associated with unsafe water and sanitation, like diarrhea, have also significant expression in the country.

On the other hand, physical infrastructure (such as roadways, systems of water and power supply, telephone lines, and household waste disposal systems, health facilities and schools), their availability and quality of services provided have also a substantial affect on wellbeing. Due to the destruction of houses and basic infrastructures occurred after 1999 referendum, a great effort are been made in the rehabilitation and construction of infrastructures.

5. Final Remarks

Just like in many other developing countries, land performs a crucial role in the development of rural areas in Timor-Leste and in the path to achieve a higher level of well-being. The Timor-Leste world is diverse and complex, with a specific cultural matrix which has survived the Portuguese colonisation, the Japanese invasion, the Indonesian occupation, the transition process conducted by the United Nations towards restoration of independence and the early stages of a newly independent nation. The diversity and complexity of the cultural matrix has been determinant for the patterns of land use observed in the country.

This cultural matrix is a fundamental element in building the nation and therefore in achieving development. Indeed, according to David Landes (1998), nations are important for a development process insofar as they can reconcile social purposes and individual action, enhancing the latter’s performance through collective synergy. Identity is a crucial issue for at least two more reasons.

First of all, as a human right, cultural freedom becomes a development goal in itself within a human rights approach to development as we have stressed in the introduction. Cultural freedom is about allowing people having the freedom to choose their identities and to lead the lives they value, without being excluded from other choices important to them, such as those for education, health or job opportunities (UNDP 2004: 6) and for this reason is an essential component of the development concept.

Furthermore in development processes leaving behind their culture, in order to enjoy the delights of development is not even an option as many studies have shown that the only countries that have recently succeeded in development are those that kept intact the spine of their culture, such as the East and South East Asian countries. Modernization theorists believed that cultural change was an important and decisive part of the development process but it is now fully accepted that the secret of the success in what were once called the New Industrialized Countries of the Far-East was the combination of openness to the external winds of progress, namely technical progress, and the cultivation of tradition. Because

societies always seek to change and to last, as Marie Dominique Perrot puts it well, this combination appeared to be mutually beneficial, since change ensured continuity and tradition worked as a technique to incorporate change (Perrot 1994: 42).

This paper has sought to highlight some of the relationships between land use patterns and well-being of the population, through the identification of services supplied by land and their contributions for the constituents of well-being. The main land use patterns in Timor-Leste are: natural and semi-natural ecosystems, subsistence agriculture, sacred, housing and basic infrastructures and industries and services.

For Timor-Leste rural communities, land use patterns produce a set of goods and services that were classified as supporting, provisioning, regulating and cultural which are essential for their survival and well-being. The goods and services provided by land are linked to the components of human well-being: security, basic material for a good life, health and good social relations.

Due their cosmology and heavy dependency on natural resources, the people of Timor-Leste have established a very close relationship with nature, which provides them with essential goods and services such as water, land, food, firewood, building materials and spiritual enrichment; thus land plays a central role within families' and communities' well-being. Many of the goods and services that back well-being have a public or common pool good nature, thus without a market value and not subject to commodification.

Poor people in Timor-Leste are the most vulnerable and severely affected when the environment is degraded or their access to natural resources, namely land is limited or denied. The reasons for these are people's limited assets and dependence on common pool property resources for their livelihoods. These facts should be considered when elaborating, adopting and implementing policies and laws directed for rural areas.

In spite of all efforts made by the international community and the Timorese government, the human development index (HDI) in 2007 ranks the country in 162nd out of 182 countries while the human poverty index (HPI-1) ranks Timor-Leste in 122nd among 135 countries. In overall terms, the well-being of rural Timor-Leste is low and there has been little improvement in terms of tackling poverty, principally for the poorest people of Timor-Leste generally those who have little or no education and work in agriculture (HDI 2009).

In Timor-Leste people and land have a close and holistic relationship and land provides to the population not only economic benefits but also important cultural services. In sum, as shown above, all the networking between land uses, land services and constituents of well-being are interconnected and contribute to the ultimate well-being benefit of "Freedom of choice and action".

References

- BirdLife International. 2010. In Timor-Leste, in 2007, three IBAs were linked and protected as the first National Park. Presented as part of the BirdLife State of the world's birds website. Available from: <http://www.biodiversityinfo.org/casestudy.php?r=response&id=231>, Checked: 11th April 2010.
- Bovensiepen, Judith. 2009. "Spiritual Landscapes of Life and Death in the Central Highlands of East Timor", *Anthropological Forum*, 19(3): pp. 323–338.
- Carvalho, Demétrio do Amaral. 2004. Demetrio do Amaral de Carvalho champions East Timor's environment, Goldman Environmental Prize 2004. Available from <http://www.grist.org/article/nijhuis-carvalho/> Checked: 11th April 2010.
- Castro, Jose 'Josh' Trindade Bryant. 2007. Rethinking Timorese Identity as a Peacebuilding Strategy: The Lorosa'e – Loromonu Conflict from a Traditional Perspective. The European Union's Rapid Reaction Mechanism Programme Technical Assistance to the National Dialogue Process in Timor-Leste.
- CESCR, General Comment 4; UNHCHR, The right to adequate housing (Art.11 (1)): 13/12/91. CESCR General comment 4.
- Cinatti, Ruy. 1950a. Reconhecimento de Timor, Relatório de Tirocínio do Curso de Engenheiro Agrônomo, Instituto Superior de Agronomia, Lisboa.
- Cinatti, Ruy. 1950b. Esboço Histórico do Sândalo no Timor Português, Ministério das Colónias, Junta de Investigações Coloniais, Lisboa.
- Cinatti, Ruy. 1965. "A pescaria de Be-malai: Mito e Ritual", *Geographica*, 1: pp. 32-51.
- Cinatti, Ruy, Leopoldo de Almeida and Sousa Mendes. 1987. *A Arquitectura Timorense*, Lisboa: Instituto de Investigação Científica Tropical /Museu de Etnologia.
- Collins, Sean W.M., Xisto Martins, Andrew Mitchell, Awegechew Teshomeand and John T. Arnason, 2006. "Quantitative ethnobotany of two East Timorese cultures", *Economic Botany*, 60 (4): pp. 347-361.
- Collins, Sean W.M., Xisto Martins, Andrew Mitchell, Awegechew Teshomeand and John T. Arnason, 2007. "Fataluku medicinal ethnobotany and the East Timorese military resistance", *Journal of Ethnobiology and Ethnomedicine*, 3(5): pp. 1-10.
- De Groot, R. S. 2006. "Function Analysis and Valuation as a Tool to Assess Land Use Conflicts in Planning for Sustainable, Multi-Functional Landscapes", *Landscape and Urban Planning*, 75: pp. 175-186.
- Direcção Nacional de Estatística (DNE), 2006. Census da população e da habitação 2004, Atlas. Díli: Direcção Nacional de Estatística e United Nations Population Fund.
- Direcção Nacional de Estatística (DNE), 2008. Final Statistical Abstract: Timor-Leste Survey of Living Standards 2007. DNE 2008.
- Directorate of Agribusiness. 2009. Commodity Profiles Series - Rice, Maize, Coffee, MAP, Díli, Timor-Leste.
- Fox, James (ed.). 1980. *The Flow of Life: Essays on Eastern Indonesia*, Harvard University Press, Cambridge.
- Gomes, Rui. 2009. The Millennium Development Goals: Approaches to Transformation, presentation at Conference on 'Transforming Timor-Leste for Sustainable Development, Human Rights and Peace', Díli, July 5-7.
- Gusmão, Marçal. 2003. Soil conservation strategies and policies for East Timor, Project submitted for partial fulfilment of the requirements for the degree of Master of Soil Management and Conservation.
- HDI. 2009. Available from: http://hdrstats.undp.org/en/countries/country_fact_sheets/cty_fs_TMP.html Checked: 11th April 2010.
- Landes, D. 1998 *Wealth and Poverty of Nations*, New York: Norton.

- McWilliam, Andrew. 2005. "Houses of Resistance in East Timor: Structuring Sociality in the New Nation", *Anthropological Forum*, 15(1): pp. 27-44.
- MED. 2008. Comissão Nacional de Pesquisa e Desenvolvimento, Relatório do Estado da Nação, Volume I, II & IV, Díli, Timor-Leste.
- Millennium Ecosystem Assessment. 2003. Assessment: Ecosystems and Human Well-being: A Framework for Assessment, Island Press.
- Ministério das Finanças (MF). 2008. Timor-Leste: Poverty in a Young Nation, Direcção Nacional de Estatística and World Bank, Díli.
- Moreira, Fausto. 1968. Contribuição para o conhecimento das plantas medicinais do Timor Português, Separata da Revista Portuguesa de Farmácia, Volume 18, pp. 13-18.
- Mota, F. 2002. *Timor-Leste: As novas Florestas do País*. Ministério da Agricultura e Pescas, Direcção Geral de Agricultura, Divisão de Florestas.
- NDFWR (National Directorate of Forestry and Water Resources). 2004. Policy and Strategy Forestry and Watershed subsector, Ministry of Agriculture, Forestry and Fisheries (MAFF), Díli.
- Narciso, Vanda and Pedro Henriques. 2008. 'Gender and Development: the Role of Women and its Relation with Land in East Timor', paper presented at European Association for Evolutionary Political Economy Annual Conference, *Labour, Institutions and Growth in a Global Knowledge Economy* held in Rome on 8 November 2008.
- Old, Ken, Mario Nunes and Tim Vercoe. 2003. Forestry — for economic, social and environmental benefits, in ACIAR Proceedings No. 113, Agriculture: New Directions for a New Nation — Timor-Leste, Edited by Helder da Costa, Colin Piggin, Cesar J. da Cruz and James J. Fox.
- Perrot, M. D. 199) "À propos du culturalisme: du super flou au superflu?," in G. Rist (ed) *La Culture Otage du Développement*, Paris: L'Harmattan: 31-49.
- RDTL. 2005a. Natural resources and Environment: Priorities and Proposed Sector Investment Program, Several Ministries, Díli.
- RDTL. 2005b. Housing and Urban Development, Priorities and Proposed Sector Investment Program, Ministry of Transport, Communication and Public Works, Díli.
- RDTL. 2005c. Agriculture, Forestry and Fisheries, Priorities and Proposed Sector Investment Program, Several Ministries, Ministry of Agriculture Forestry and Fisheries, Díli.
- Reis, Luís Manuel Moreira da Silva. 2000. Timor-Leste, 1953–1975: O desenvolvimento agrícola na última fase da colonização portuguesa, Tese de mestrado em Produção Agrícola Tropical, Universidade Técnica de Lisboa, Instituto Superior de Agronomia, Lisboa.
- Soeiro de Brito, Raquel. 1971. "Ocupação do Solo no Timor Português", *Geographica*, 27: pp. 1-29.
- São Tomás, Frei Alberto de. 1969. Virtudes de Algumas Plantas da Ilha de Timor, Ministério do Ultramar, Lisboa.
- Sen, Amartya Kumar. 2000. Development as freedom, First Anchor Books Edition.
- Sá, Artur de, 1952. Timor, Sociedade de Geografia de Lisboa, Semana do Ultramar, Reeditado por TimorAgri.
- Silva, Hélder Lains e. 1956. Timor e a Cultura do Café, Memórias – Série de Agronomia Tropical, Junta de Investigações do Ultramar, Ministério do Ultramar, Reeditado por TimorAgri.
- Sylvan, Fernando. 1981. Cantogrito Maubere, Livraria Ler, Lisboa.
- Tavares, Mário. 2010. The Timor-Leste coffee production, Personal interview conducted in Díli and Ermera.
- Traube, Elizabeth. 1986. Cosmology and Social Life: Ritual Exchange among the Mambai of East Timor, University of Chicago Press, Chicago.

- UNDP (2004), *Human Development Report: Cultural Liberty in Today's Diverse World*, Oxford University Press.
- UNDP. 2006. Timor-Leste Human Development Report 2006- The Path out of Poverty, Díli, Timor-Leste.
- UNWFP (United Nations World Food Programme). 2006. Timor-Leste: Comprehensive Food Security and Vulnerability Analysis (CFSVA), FAO, Rome.
- WHO. 2006. Mortality Country Fact Sheet 2006.
- World Bank. 2001. World Development Report 2000/2001: Attacking Poverty. Oxford: Oxford University Press.
- World Bank. 2003. *Timor-Leste, Poverty Assessment - Poverty in a New Nation: Analysis for Action*, Díli, Timor-Leste: World Bank.
- World Bank. 2008. Policy note on population growth and its implications in Timor-Leste. The World Bank Washington, D.C..