

Forest reliance as a livelihood strategy in Timor-Leste

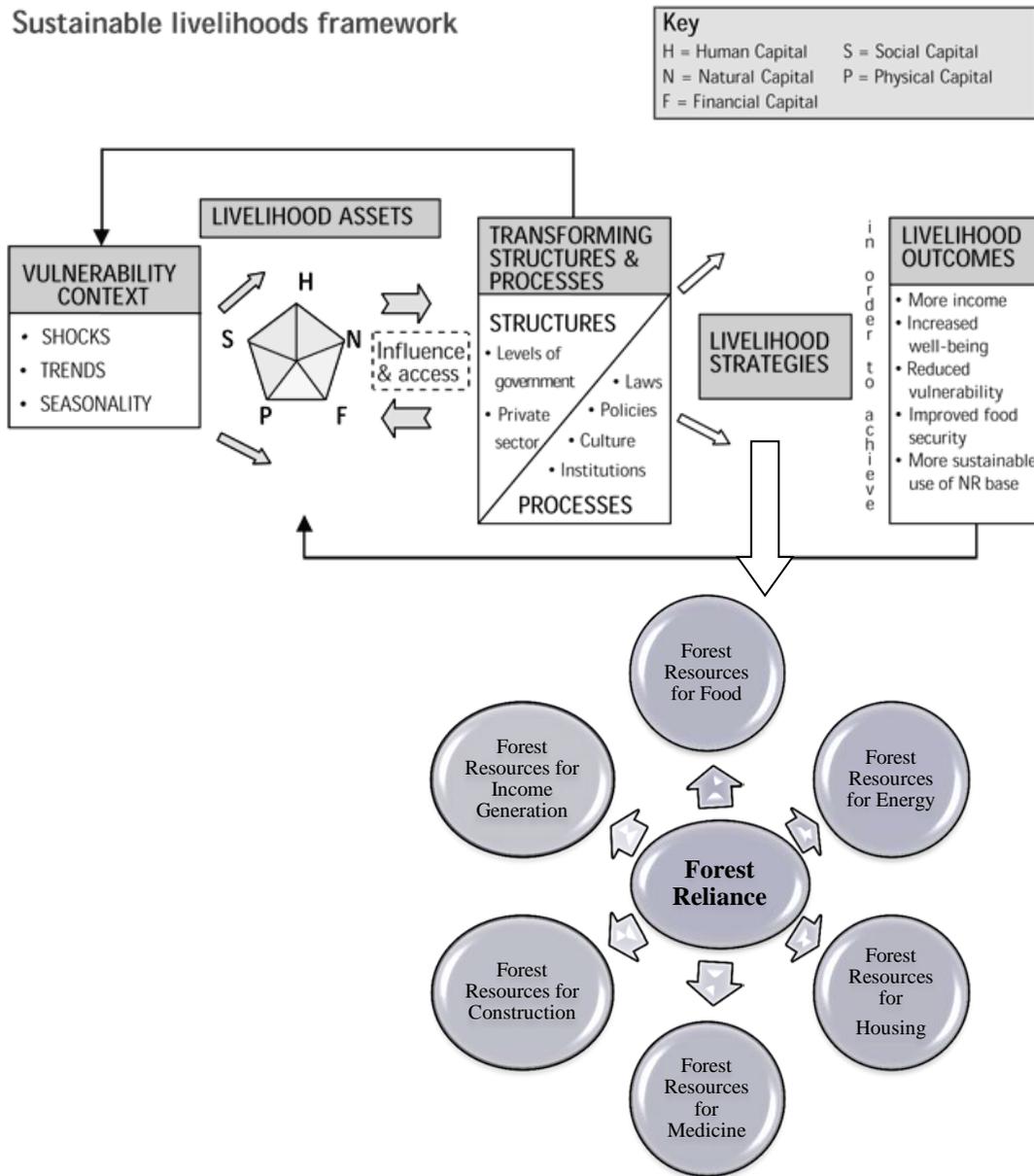
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Introduction

Timor-Leste's environment has been under fundamental stress since the colonial period, particularly during the Indonesian occupation when much of the country's primary forests was logged or burned (The World Bank 2009). Today, the sustainability of forests in Timor-Leste continues to be threatened by increasing population pressures and poor environmental governance. The country's deforestation rate remains one of the highest in the world at 1.3 percent (The World Bank 2008). Population growth rate on the other hand is very high at 2.41 percent due to unprecedented high fertility rate of 5.7 children per women (The Government of the Democratic Republic of Timor-Leste 2010). While forests are disappearing at a rapid rate, the impact of the same on people's livelihoods is unknown. This paper aims to highlight the role of forests in supporting people's livelihoods in Timor-Leste. The conceptual framework in this paper applies a sustainable livelihoods approach for its analysis and identifies forest reliance as a household's livelihood strategy. Within this framework livelihood strategy is considered as the range and combination of activities and choices that people make and undertake in order to achieve their livelihood goal (DFID 1999). Adopted from DFID's conceptual framework this paper explores six distinct uses of forest resources under the context of a household's forest reliance (see Fig 1). Forest reliance in this paper is considered as a livelihood strategy adopted by households in order to achieve livelihood goals expressed in terms of improved wellbeing, increased income, improved food security and reduced vulnerability.

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Figure 1- Conceptual Framework adopted from DFID



Method of analysis

The findings of this research are based on primary data consisting of 170 household level interviews and four focus group discussions, which were collected in five districts of Timor-Leste during field work undertaken between 2011 and 2012. The households and focus group participants were randomly selected from a total of eight villages located in the districts of Ainaro, Manufahi, Liquica, Lautem and Dili. A stratified sampling method was employed in the selection of these regions on the basis of their forest cover, poverty and fertility rates. For data analysis, statistical software SPSS version 21 is used.

Findings

The fieldwork data collected for this research shows that 60 percent of the households live very close to the forests, the distance being on average within 1.5 kilometres. Sixteen percent of the households had ownership of natural (primary) forest with an average size of 4.1 hectares. The findings also reveal a strikingly high percentage of forest product collection with 93 percent of the households collecting forest products for food, construction, selling, medicine or firewood in the past year. The key findings of each individual component of forest reliance are presented below.

Forest product reliance for housing

Forest resources make up a large component of the materials used in the construction of a local house, making them a major source of shelter for the Timorese people. Results from the 2001 World Bank housing strategy survey indicated that of the estimated 170,000 housing units in Timor-Leste approximately 88 percent were owner occupied and self-built (Bugalski 2010). This indicates that the majority of local houses in Timor-Leste are handled and built by the local community. According to the analysis of this research, 77 percent of households live in a house that consists of forest products. Of these, 23 percent live in a house where the entire roof and walls are constructed with forest products. The most commonly collected forest resources for housing include straw, grass, leaves, bamboo and wooden boards. Bundles named as *Bebak* in the local language, a slatted panel made from the base of palm frond and *Piku*, another prefabricated panel made by palm leaf are also collected.

The community discussions revealed that the ideal house size in rural areas as advised by the village chief is 30 square metres (6 metres by 5 metres) and the households are allowed to extract 3 cubic metres of wood from the forest to build their houses. Although the Timorese government, with the intention of reducing the burden on forest resources, has lowered this amount from 5 cubic metres (which was allowed during the Indonesian period), it was argued that there is no assurance or monitoring scheme for this rule. With increasing population pressure the demand on forest products for shelter is indeed going to be prominent.

Forest reliance for construction

This research finds that 53 percent of the households have in the past year collected forest product for the construction, maintenance of a house, making furniture or construction of a sacred house. The most collected construction materials are bamboo and teak, followed by mangroves, gum, sauce tree (*Albizia* tree), coconut leaves, palm stems and rattan. The construction of a sacred house among communities with ancestral ties is particularly unique in the context of Timor-Leste as it is closely linked to people's well-being. While the intangible and spiritual side of a sacred house includes ceremonies and rituals as well as people's beliefs symbolising the building as a protective house where people from the same decent can worship and communicate with their ancestors (Carvalho 2011), the material aspect is related to its construction. Being built entirely by forest products such as timber, bamboo, wooden planks, twine and fibre ropes, the construction of a sacred house establishes a positive link between people and forests beyond productive means. However with increasing population pressures, the need for building new houses (be it for sacred or as a dwelling) will continue to impose an increased demand on forest resources for construction purposes.

Forest reliance for firewood

FAO (2010) estimates that 93 per cent of the energy consumed by households in Timor-Leste comes from wood. According to the analysis of this research each one of the households covered in the fieldwork used firewood for their energy needs in the past year. Seventy percent of the households obtained firewood only

by collection while 23 percent relied on purchasing from the market. The remaining seven percent both collected and purchased firewood. The types of wood used as energy sources are presented in table below.

Table 1 Common Types of Wood used for Energy in Timor-Leste

Tree Names Known in English	Scientific Name	Name known in Local Language	Districts in which they are widely used
Casuarina or Coffee Shade Tree	Paraserianthes falcataria	Ai Kakeu/ Ai Osoho	Ainaro, Manufahi, Lautem, Liquica (not common in Dili)
White Gum	Eucalyptus alba	Ai Bubur	Ainaro, Manufahi Dili (widely sold at the streets)
Albizia tree or white lead tree or sauce tree	Leucaena leucocephala	Ai Samtuku	Ainaro
Accacia	Leucaena	Ai Kafe/ Ai Lomtoro	Ainaro, Manufahi
Not Known		Ai Denuk	Ainaro
Teak	Tectona grandis	Ai Teka	Manufahi
Ceylon oak	Sheleichera oleasa	Ai Kaidawa/ Ai dak	Lautem, Liquica
A type of tree which turns into red colour when it matures	Not known	Ai Laran Katimu (in Bahasa)	Lautem, Liquica
Mangrove	Rhizophora mangle	Ai Parapa	Liquica
Not Known		Ai Lok	Liquica
Not Known		Ai Ru	Dili
Not Known		Ai Dadak	Dili (This type is found to be a good type as it produces little smoke however the problem is identified as the bundles sold at the market are usually a mixture of many.

Firewood collection is generally a demanding task, requiring the time and labour of members of the household. In the group of families who collect firewood 54 percent of the households stated that everyone in the family is involved in the firewood collection activity. Twenty three percent mentioned that only adults collect firewood while 15 percent indicated that the job is handled by women and children. In terms of time, the analysis showed that an average size family (5-6 people) spends around 4 to 8 hours per week. For the group of households that purchase firewood from the market, this research found that the households each spend about \$5 per week. Generally a 4-5 piece bundle of fire wood is sold at 10 cents. Considering almost half of the population lives on less than \$1 a day, the cost of firewood as well as time and labour spent in its collection put a great burden on people's livelihoods.

The heavy reliance on firewood for energy needs also exerts great pressure on forest resources and its sustainability. The analysis of this research indicates that the majority of people are well aware of the deterioration of their local environment. Forty seven percent of the households perceive that there is less firewood available compared to 5 years ago. Eighty seven percent of the households indicate that they have to walk further away to collect firewood while 50 percent argue that they spend more time in firewood collection (see Table 2). With increasing population pressures the demand for firewood for energy purposes will no doubt increase unless alternatives are provided for those who lack other livelihood choices.

Table 2 Perceptions of the firewood availability and access

Percentage of people that think	
there is less firewood available compared to 5 years ago	47
the availability of firewood is the same compared to 5 years ago	47
there is more firewood available compared to 5 years ago	6
they walk further away to collect firewood compared to 5 years ago	87
more time is required for firewood collection compared to 5 years ago	47
same time is required for firewood collection compared to 5 years ago	25
less time is required for firewood collection compared to 5 years ago	28

Forest reliance for food

The analysis of this research shows that 39 percent of the households collected forest products for food purposes in the past year. The most commonly collected forest products include jackfruit, coffee, taro, two types of root crops locally named as kontas and tali, betel nut, candle nut and also palm for wine production in the given order. When it comes to bush meat the focus group discussions revealed that hunting of deer, monkey, boar, squirrel, frog, possum, wild bird, wild cat, mouse and snake is very common.

In the focus group discussions growing population pressures and excessive hunting were raised as emerging problems. The following quote from a participant indicates the increasing human threat on forest animals which are closely linked with food security in the country.

We used to find monkeys everywhere. It was easy to hunt them but now there are so many people in the village... They caught a lot of monkeys. First only for their families but then they started to sell them. Now it is very hard to find them. We need to walk much longer into the forest to find monkeys snakes, and deer these days (A participant, fieldwork survey 2011-12).

This research has found that 14 percent of the households did not have enough food to survive in the past year and 79 percent had somewhat enough. In such circumstances further loss of forest food species can worsen the situation of food security in the country.

Forest reliance for medicine

In Timor-Leste the local knowledge of producing medicine from plants is held by a few people considered by the community to be wise with special talents named as ‘matan-do’ok’ (Carvalho 2011). The focus group discussions revealed that this knowledge is usually kept secret to ensure the sustainability of the medicinal products (plants or animals) as well as the tradition itself.

Research findings show that only 4 percent of the households, that is 7 households in total (6 male headed and 1 female headed with household heads aged 40 and above) collected forest products for medicinal purposes in the past year. This small percentage may reflect a few things. Firstly as discussed previously it may be due to the fact that the knowledge of making medicine is strictly kept among a limited number of people with special talents. Secondly the numbers of traditional healers may remain very low because of the cultural disruptions that took place during the occupation preventing the culture to be passed on. It may also be due to the fact that the sources for medicine are heavily exploited by many, making it hard to find. Finally increased health services at the community level may have caused a decline in the use of forest products for medicinal purposes.

According to the community discussions, the medicinal forest products are used to cure diseases such as cold, flu, malaria, to heal scars, cuts and to ease child labour. For example in the district of Ainaro,

the forest product `Ai kulit-manas` is used to cure sneezing, fever and malaria whereas `Ai bou` is used to ease child birth. In the district of Liquisa, the participants indicated that they use forest products to make medicine to treat headaches and coughing amongst others. Table 3 presents the local and scientific names of the forest products and includes a brief example from literature of their medicinal use.

Table 3 - Forest Products Used for Medicinal Purposes in Timor-Leste

Local Name	English or Scientific Name	Medicinal Use and Some Literature
Malu-Maluhu	Wild betel/ Wild pepper/ Wild chilly	In Timor-Leste the leaves of this medicine is used to treat headache.
Rounu	Lantana Camara	These scrubs are told to be very common between Dili and Liquica districts in Timor-Leste. It is majorly used to cure small cuts. Some literature suggests that the plant is traditionally used in Brazil and the leaves can be used as an antipyretic , carminative and in the treatment of respiratory system infections as well as healing gastric ulcers.
Due-due or Ai Badu	Jatropha (common name is physic nut and it is similar to candle nut)	The exact purpose of use is not identified in Timor-Leste however they are told to be found between Dili and Liquica districts. Literature suggests that the plant is generally used to produce light along with its medicinal benefits. The oil extracted from its leaves are used to treat babies with swollen throat or white tongue. In 2007, Goldman Sachs cited Jatropha curcas as one of the best candidates for future biodiesel production. The plant is resistant to drought and pests , and produces seeds containing 34 percent oil on average. Besides its medicinal benefits, jatropha seeds are therefore a source of biodiesel production and after oil extraction they can be burnt for energy production.
Suaha or Fukira (Tetum) Or Kadamba	Anthocephalus indicus	In Timor-Leste the green part of the bark is usually crushed into pieces and dried to cure cuts. Literature suggests that the leaves are good for pain, swelling and better healing of wounds. The bark is also argued to be a remedy for diarrhea, dysentery and colitis.
Vehu or Ai Hanek or Ai Doti	Apocynaceae, commonly called Blackboard tree, Indian devil tree, Ditabark, Milkwood pine, White cheesewood	It is known to be a big tree of which leaves and bark are used for Malaria. This type is not used for firewood as when it is burnt it causes itchiness. Literature suggests that in India the bark of <i>Alstonia scholaris</i> is used solely for medicinal purposes, ranging from malaria and epilepsy to skin conditions and asthma. Other purposes include treating diarrhea, skin disorders, malarial fever, chronic dysentery, snake bite, ulcer.
Aikulit manas or Konela or Kayu Moui	Cinnamon Bark	The use of cinnamon for medicinal purpose in Timor-Leste context is not clear however other studies argue that the essential oil from the leaves of cinnamon tree has antiviral properties specifically against oral and genital herpes. It is also suggested that cinnamon improves glucose and lipids of with type 2 diabetes.
Ninu or Mankudu or Nenuk	Not Known	In Timor-Leste this plant is used for so many purposes including treatment of high blood pressure, fever, TB, cancer.
Pailalaha or Gaharu	Not Known	This small shrub type plant is told to be boiled to treat diarrhea among children in timor-Leste
Ai Dik	Flame Tree or	Literature suggests that the flowers of this plant are

	Golden Rain Tree <i>or Koelreuteria</i>	ophthalmic and can be used to treat complications related to anatomy, physiology or eyes.
Mauimi watu	Not Known	Putu is known to be the local name of the medicine produced.
Ipu-dudu	Not Known	N/A
Ai-bokur	Gum Tree	N/A
Memaja	Not Known	N/A

Forest reliance for income generation

This research finds that 42 percent of the households collected and sold forest products during the past year. The most commonly sold forest products included jackfruit, wild coffee, candle nut, palm stems and leaves, coconut leaves, teak, bamboo, palm wine, betel nut, coconut, taro, vanilla, and mahogany in the given order. The majority of forest products are sold to locals and visitors. Coffee, palm leaves and stems, teak and vanilla are generally sold to different parties such as cooperatives, non-government organisations, the government or private entities. Table 4 provides information on the unit prices of the forest products that were collected and sold in the past year.

Table 4 Forest Products Collected and Sold

Name	Unit	Market Price in US\$
Bamboo	1 piece	\$2.5-3 (depending on length)
Coconut leaves	1 bundle	\$2.5
Palm stems	1 bundle	\$2.5
Palm leaves	1 bundle	\$2.5
Teak	m ³	More than \$500 (About \$10 per tree 10-15 diameters)
Firewood	1 bundle	10 cents
Candle nut	1 kilo	80 cents if separated from the shell 40 cents if not separated from the shell
Betel nut	Stick or Leaves	A stick is 5 cents, leaves are 25 cents. (1 stick is enough for 2-3 days and people on average spend 1\$ spent per week on all parts)
Palm Wine	1.5 Litre Bottle	\$4 if processed 1.5\$ if not processed (Generally 5 litres is \$10)
Jackfruit	1 Piece	\$2.5 depending on size. There is a type only used for vegetables and that is 25 cents per piece.
Coffee	1 kilogram	50 cents (beans) \$2 (powder)
Taro	2-3 pieces a bundle	50 cent to \$1 depending on the size
Mahagoni	m ³	More than \$300
Vanilla	Not known	Not known
Rattan	Not known	Not known

Conclusion

This paper provides important information related to forest reliance in Timor-Leste at the household level. It highlights the traditional use of forest products for agricultural, construction, cultural and medicinal purposes. It finds considerably heavy reliance on forest products with 77 percent of the households collecting forest products for energy, 53 percent for construction, 42 percent for income generation and 39 percent for food in the past year. Having identified the nature of forest reliance and types of commonly collected forest resources for local livelihoods, this paper suggests that the sustainability of forests in Timor-Leste can't be ensured unless conservation targeted policies address people's diverse dependence on forest resources for their well-being. Hence it is vital that the knowledge of the traditional use of forest products is not undermined by policy makers and not lost to future generations in an ever increasingly globalised environment. The burden of losing the forest resource base and the knowledge of its traditional use would not only fall on the communities themselves but also on the government. Therefore this paper argues that for the well-being of local communities the wealth of forest resources needs to be protected and its traditional use needs to be encouraged within sustainable limits. This paper also encourages improved market opportunities and pricing for forest products and technological and human resource advancement for their production, harvesting and processing. Finally this paper recommends further analysis of the factors that influence a household's reliance on forest resources (such as demographic and socio-economic factors, household poverty and household's livelihood assets) for better targeting of conservation and development policies.

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