On behalf of:
Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety
of the Federal Republic of Germany

Assessing Opportunities for Forest Landscape Restoration in Quang Tri, Vietnam

Located on the Demilitarized Zone in the Central of Vietnam, Quang Tri Province was devastated during the American War. Following the economic reforms initiated in the late 1980s, the province embraced forest restoration by planting fast growing eucalyptus and acacia species. Forest cover quickly increased from 98,000 hectares in 1989 to 235,000 hectares in 2016. However, forest quality is generally low, and plantations are almost entirely geared toward short rotation acacia for low-value wood chips. Meanwhile, natural forest has declined. Quang Tri also faces increased pressure on its forests from expanding agriculture. The expansion of cassava cultivation on steep slopes is of particular concern.

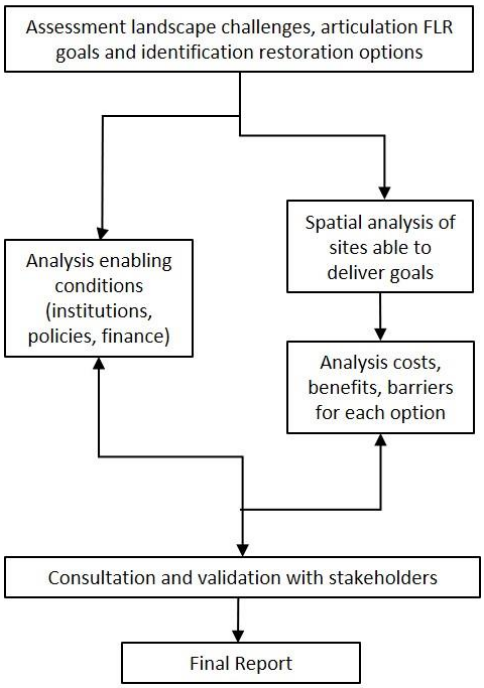
In collaboration with Quang Tri Department of Forest Protection, IUCN conducted a Restoration Opportunities Assessment Methodology (ROAM) to map Forest landscape restoration (FLR) opportunities. Provincial stakeholders defined three FLR goals:

1. Increase forest biodiversity and quality
2. Conserve and enhance ecosystem services (including watershed protection, erosion prevention and habitats for biodiversity)
3. Improve livelihoods for local people to reduce incentives to encroach on the forest

Box: ROAM methodology in Quang Tri

ROAM was developed by IUCN and World Resources Institute (WRI) to identify the conditions and information that can lead to improved landscape management; it embraces a participatory and iterative approach, involving stakeholders at key moments. The main components as applied in this study were:

- **FLR challenges:** IUCN undertook a scoping study in July 2016 and met with government agencies at both national and provincial level. In October 2016, inception workshops were held in Quang Tri and Hanoi to identify FLR goals and models.
- **Spatial analysis:** GIS was used to identify priority FLR areas. This made use of datasets on land cover, forests, elevation, slope, watersheds, biodiversity areas, forest tenure, and climate. These were consolidated into a GIS system to identify opportunities.
- **FLR options:** Identified options were analyzed in terms of costs, benefits and barriers. The team visited Quang Tri in May 2017 to undertake key informant interviews.
- **Enabling conditions:** The WRI/IUCN Rapid Restoration Diagnostic tool was used to identify institutional and policy challenges; and complemented with a financial analysis to assess funding sources.
- **Validation**: Findings and conclusions were validated in a workshop with relevant stakeholders in January 2018.



Forest Landscape Restoration options

Forest landscape restoration (FLR) has become widely recognized as an important means of restoring large areas of degraded and deforested land in ways that contribute to local and national economies, sequester significant amounts of carbon, strengthen food and clean water supplies and safeguard biodiversity. Four FLR options were identified that could help to meet these goals: (1) enrichment planting (EP) and assisted natural regeneration (ANR) in degraded natural forest, (2) extended rotation (ER) and (3) native species introduction (NSI) in plantations, and (4) soil and water conservation (SWC) in rainfed agriculture.

- *EP/ANR* are used to increase the density of desired tree species in degraded natural forests and the protection and preservation of natural tree seedlings in forested areas; these techniques improve forest quality and biodiversity, reduce erosion, improve water quality, and can provide an alternative source of income for farmers/landholders.
- *ER* is about converting short rotation acacia plantations into longer-rotation plantations to reduce erosion by decreasing the time land is bare after harvesting; this technique reduces sedimentation and improves water quality, while increasing income from high value timber.
- *NSI* is used to transition monoculture acacia plantations to host a variety of native species to improve ecological outcomes; it contributes to the same goals as extended rotation but has a stronger emphasis on biodiversity.
- *SWC* refers to measures to reduce soil loss as result of erosion and increase water retention in agriculture, e.g. through fertilizer use, intercropping, and cross-slope barriers; these measures also contribute to higher yields for farmers.

FLR priority areas

FLR priority areas were identified using GIS analysis, which assessed areas in relation to three criteria: forest quality and biodiversity; water quality in key river basins; and erosion risk on sloping land. The table shows a summary of the results.

The total area proposed for FLR is almost 54,000 hectares or 11% of the total area of the province (taking into account almost 1,100 hectares of overlap between selected areas) (Map 5).

Restoration area	FLR intervention	Land cover	Area (ha)	Total (ha)
Special-use forest (poor quality sites)	• EP/ANR of poor quality forest, with support of PES	• Poor evergreen forest • Bare land with trees	2,197 4,106	6,303
Biodiversity corridor (selected areas)	• EP/ANR of poor quality forest and other selected (and to be converted) land	• Poor evergreen forest • Bare land with trees • Plantation • Agriculture (rainfed) • Transitional areas	1,383 2,365 497 2,753 2,881	9,879
Plantations upstream key river basins	• ER and/or NSI (and FSC)	• Acacia plantations held by large landholders	9,541	13,533
	• ER and/or NSI (and FSC)	• Family-held acacia plantations (> 10 ha)	1,332	
	• ER with support of FSC	• Family-held acacia plantations (3-10 ha)	2,660	
Agriculture (rainfed) at high risk of erosion	• SWC through fertilizer use, intercropping, and cross-slope barriers	• Agriculture (rainfed) at high erosion risk, with particular attention for cassava areas	24,975	24,975

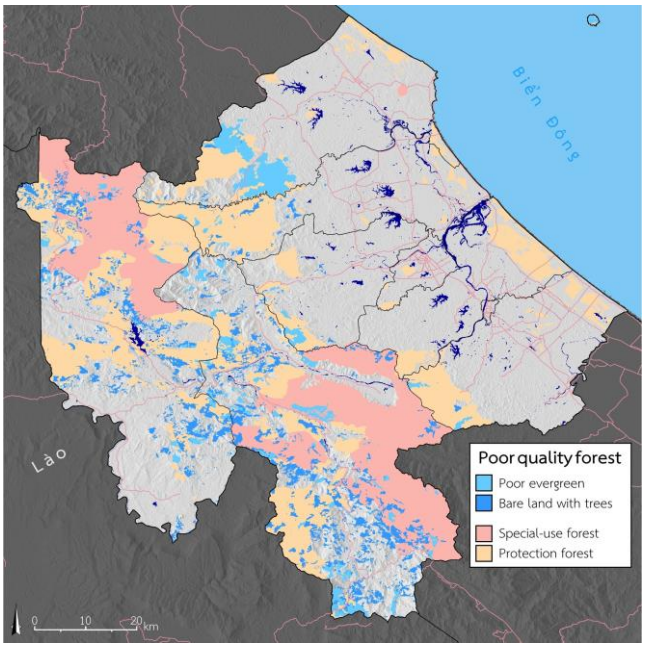
Note: PES=Payment for Ecosystem Services; FSC=Forest Stewardship Council; 1,042 hectares of agriculture (rainfed) at high risk of erosion and 36 hectares of plantations (> 3 hectare) upstream key river basins are located within the biodiversity corridor

Natural forest quality was assessed based on forest type, age, and substrate. For FLR purposes “poor evergreen forest” and “bare land with trees” within special-use forest (SUF) were prioritized for EP/ANR since it will be easier to restore forests within a legally protected area (Map 1). To reduce forest fragmentation and enhance biodiversity, a corridor is proposed between the two SUFs in the northwest and south of the province to connect natural forest and allow wildlife to move between them (Map 2).

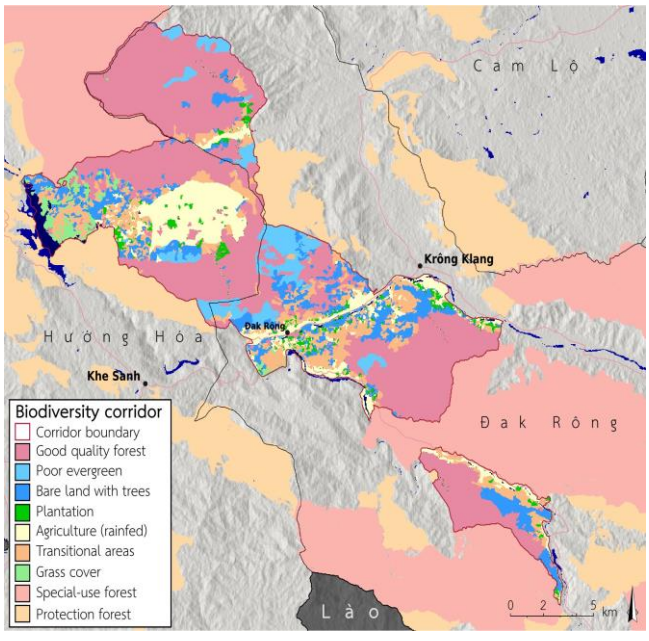
Short rotation plantations frequently expose soil to erosion. To reduce soil loss and its impact of water quality through longer rotations, an assessment was made of plantation types in major upstream river basins; 16,674 hectares of acacia plantations were identified as potential FLR areas, but family holdings of less than 3 hectares covering 3,141 hectares were excluded because longer rotations are not economically feasible on such small holdings (Map 3).

ER is recommended for all plantations larger than 3 hectares. NSI is recommended for plantations larger than 10 hectares as this requires a longer timeframe to realize return on investment. Given the growing demand for legal timber from Vietnam’s thriving wooden furniture sector, FSC certification is relevant to all sizes of timber (but not wood chip) plantation. The advantages of FSC certification may be particularly important for small family-owned plantations.

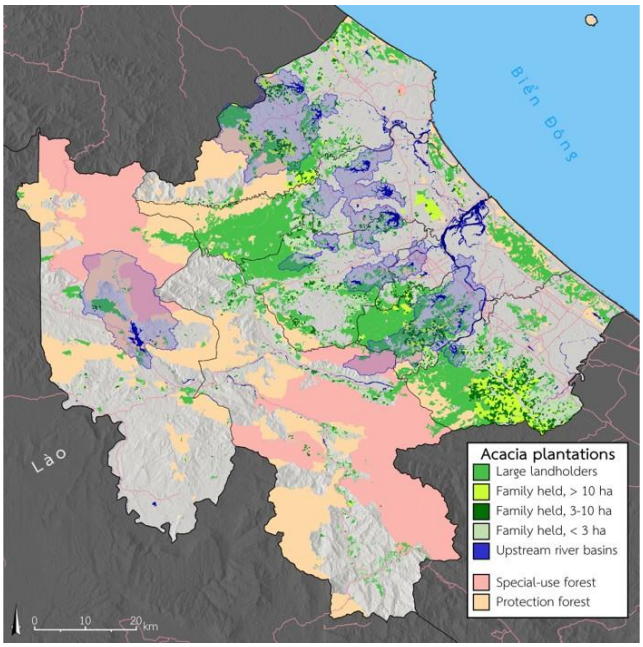
A GIS model, RUSLE (Revised Uniform Soil Loss Equation), was used to map areas at risk of soil erosion based on maximum rainfall, slope length and steepness, and erosion-susceptibility of land cover type; 27% of rainfed agriculture, almost 25,000 hectares, is at high risk of erosion and recommended for SWC. Most of this 27% is in mountainous areas in the west of the province, mostly in Huong Hoa District, the main cassava producing area. Another 11,600 hectares of transitional areas with high erosion risk close to both SUFs (especially in the south) was identified showing extensive signs of human use. Due to the dynamic and small-scale nature of agriculture (mainly swidden) in these areas, it is difficult to target them with specific interventions, but they do require further attention (Map 4).



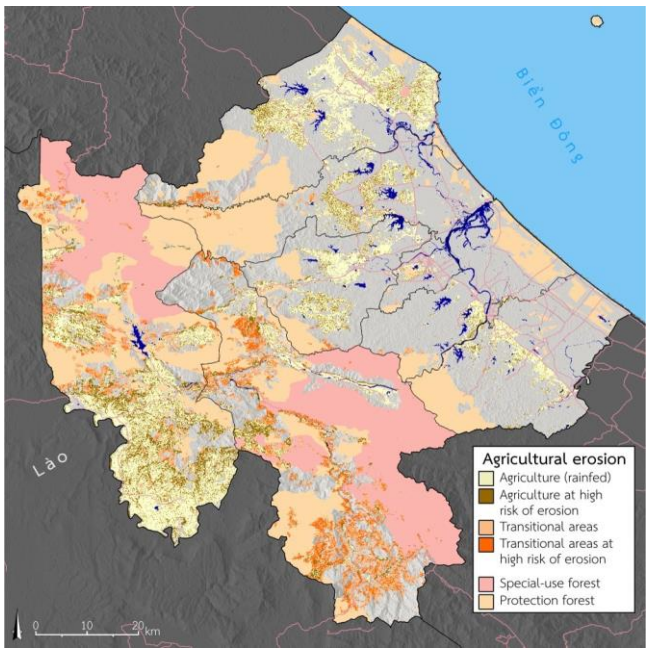
Map 1: Poor quality forest



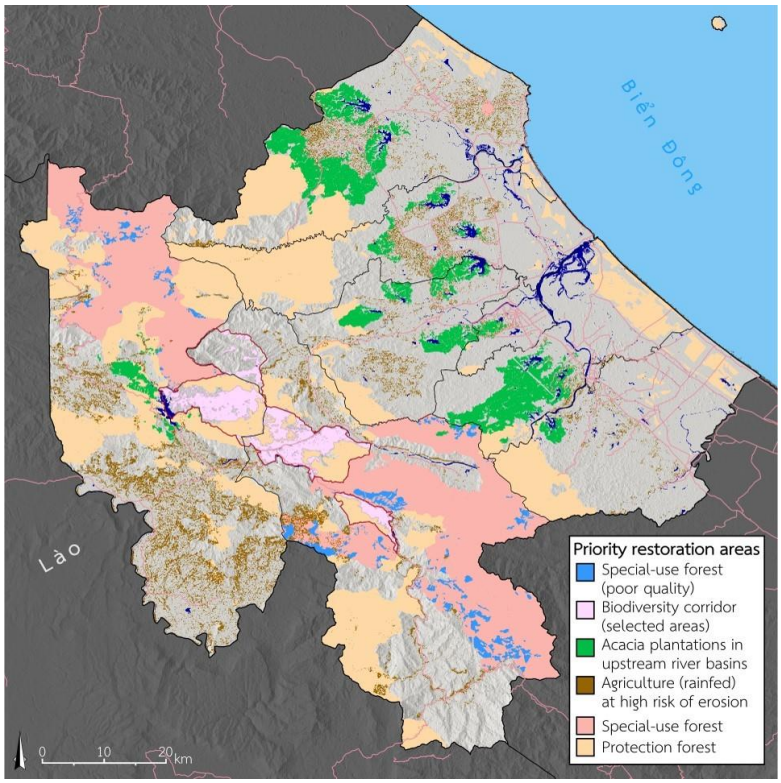
Map 2: Biodiversity corridor



Map 3: Plantations upstream key river basins



Map 4: Agricultural erosion and high risk area



Map 5: Priority restoration areas in Quang Tri

Benefits, costs and barriers

FLR options were assessed in terms of benefits, costs and barriers. EP/ANR are effective in restoring degraded natural forest and enhancing biodiversity. But their costs are high and vary greatly depending on the amount of labor required, and success depends strongly on maintenance and follow-up.

Alternatives were explored to transition short rotation acacia plantations. UNIQUE, a German consultancy, has developed two business models: for ER (11 years) and for NSI (long-term, with stepwise acacia replacement during first 11 years). Longer rotations reduce soil erosion by limiting the amount of time that soil is bare. Both options are more financially profitable than short rotation acacia. However, high investments costs and longer payback periods limit their suitability to larger plantations. Unlike acacia for wood chip, value chains are currently not well developed for timber production, especially of high-value native species.

To address the impact of agriculture on soil erosion and reduce pressure on forestry land, several SWC measures were identified: fertilizer use, intercropping, and cross-slope barriers. While these were analyzed for cassava, they have general applicability. Use of fertilizer and intercropping (with black beans and groundnut) increase yields, improve water retention, and reduce soil loss. The use of fertilizer suited for cassava allows for continuous cropping and pays itself back within two years. Intercropping is financially attractive but is labor intensive. Cross-slope barriers are particularly effective at preventing erosion on steep slopes, but yield increases take longer to materialize.

All these FLR options increase carbon sequestration. On a per unit area basis, the highest potential gains are from natural forest regeneration. But in terms of total carbon sequestration over 25-30 years, the highest gains may come from agricultural improvements because this covers a much larger area. This demonstrates the need for a landscape approach to FLR.

Enabling conditions

Four factors are considered critical for successful FLR: (1) motivation of key actors, (2) capacity and resources for implementation, (3) policy support and enforcement; and (4) access to markets and value chains.

In Vietnam, factors both support and present barriers to FLR. For example, a high degree of tenure security allows farmers to invest in higher value timber species. But the need to generate immediate income forces most farmers to rely on short rotation acacia for low-value wood chip. Similarly, logging bans often force farmers to engage in unsustainable “cut and run” logging rather than in sustainable harvesting of natural forest, which a series of KfW projects in Vietnam has shown to be profitable.

A particular problem in Quang Tri is the very successful introduction of acacia. This has resulted in the rapid recovery of forest cover and rehabilitation of barren lands. But the large-scale mono-cultures that dominate the province are vulnerable to disease and declining quality and represent a growing economic risk. The almost exclusive focus on acacia has resulted in the forestry sector, from research to extension to marketing, becoming “acacia-ized”, which limits the scope for the province to move up the value chain by investing in longer rotations and native species plantations. When it comes to availability of native tree species seedlings with good quality or sophisticated silviculture (beyond “plant and cut”) or certification there is also significant lack of technical capacities.

In the agricultural sector, the rapid expansion of cassava on steep slopes increases soil erosion and threatens natural forest. CIAT has tested a range of SWC measures in Vietnam but adoption among smallholders has been low, partly because of the high labor requirements and uncertain yield increases,

but also due to costs of inputs. Again, this is an area where government can play a key role by strictly protecting the remaining areas of natural forest and training farmers on sustainable intensification while improving access to key resources.

The key barriers to FLR are not only technical but also financial, policy, and institutional. Except for EP/ANR, all the proposed FLR options are profitable, albeit often over relatively long-time periods and in most cases with high up-front costs, which may not be affordable to farmers. This is where government can alleviate financial bottle-necks that would allow the forestry sector to achieve its full potential.

A key policy and institutional barrier remains the focus on forest quantity. Nationally, forest cover is rising but this is almost exclusively due to plantations using fast growing exotic species, particularly acacia. Between 2005 and 2015, Quang Tri lost 35,000 hectares of natural forest, which was offset by a 57,000 hectare increase in plantations, resulting in a net forest gain of 22,000 hectares. These plantations are of very low biodiversity value and, in the case of Quang Tri, expose the land to erosion because of the short rotation. Shifting priority from quantity to quality would require reforms at the highest level of government. The revised 2017 Forestry Law provides an opportunity to develop circulars and decrees that could accelerate FLR.

Conclusions and Recommendations

Implementing FLR in the 54,000 hectares that this assessment has prioritized could significantly improve forest quality and rural livelihoods in Quang Tri, and contribute to climate change adaption and mitigation. Successful FLR implementation will require improvements in knowledge, technical capacity, and incentives. The government has a key role to play in transitioning from quantity to quality by engaging business and supporting new timber value chains, strictly protecting the remaining natural forest, assisting farmers achieve group certification, insuring farmers against natural disasters, and using PES to finance sustainable cassava intensification.

The following recommendations are proposed:

- **New vision and policy**: Quang Tri, perhaps with neighboring provinces, should prepare a FLR vision that adopts a landscape approach to ensure strict protection of the remaining natural forest, reorienting plantations to produce FSC-certified timber over longer rotations for the domestic and export market, and transitioning from acacia monocultures into native species forests. This transition would take 20-30 years and would increase carbon stocks, soil and water conservation and biodiversity. Given the alignment with REDD+ objectives and the growing interest nationally in environmental quality and green growth, it is recommended that the provincial government put in place a new policy framework on forming its provincial development strategies based on the recommendations of this ROAM assessment.
- **Innovative financing**: Quang Tri can reduce financial barriers to this forestry transition in various ways. It can work with the Vietnam Bank for Social Policies and other state funding programs to provide credit to households willing to invest in ER plantations and NSI. This is most likely to involve households with more than 3 hectares of forest in the case of ER and more than 10 hectares in the case of NSI. It can also improve the targeting and monitoring of PES to provide sufficient incentives to avoid deforestation and degradation, while piloting PES in areas that provide important ecosystem services but fall outside traditional forest management areas (e.g. for implementing cross-slope barriers in agricultural lands). In addition, the government could set up insurance schemes to reduce risks of ER and NSI, and/or encourage farmers to sustainably intensify rainfed crops, especially cassava. The government can play a key role to facilitate

communication along value chains to create institutional arrangements whereby wood processors assist farmers to overcome technical and financial barriers to achieve FSC certification while ensuring a stable and high-quality supply of timber.

- **Improved extension**: Intercropping, cross-slope barriers, and other measures have been shown to reduce soil loss, maintain soil fertility, and increase yields. But uptake is low, often because of the misunderstandings over the costs and benefits. Quang Tri should develop pilots and organize visits to successful pilots in other provinces to encourage their adoption and sustainable intensification, particularly of cassava. Government assistance with the procurement of fertilizer suitable for cassava could be made conditional on farmers adopting these measures and stopping any further clearing of natural forest. Visits of successful pilots can also extent to sustainable plantation management. For households with less than 3 hectares, the province can help them secure group FSC certification, possibly in cooperation with wooden furniture companies that need to secure their supply. Given the focus on acacia, the province may need to help farmers source and care for native species in order to move to higher value timber production.

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