Working Paper

Agroforestry and Forestry in Sulawesi series:

Local perceptions of forest ecosystem services and collaborative formulation of reward mechanisms in South and Southeast Sulawesi

Elizabeth Linda Yuliani, Agus Mulyana, Hasantoha Adnan, Philip Manalu, Ramadhani Achdiawan, Pisca Tias and Moira Moeliono, with Balang and Teras

World Agroforestry Centre

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Balang is a South Sulawesi-based NGO. It aims to improve the quality of life and capacity of local communities living in and around the forests. Balang facilitates and supports local people in managing community forestry and village forest schemes. It also conducts participatory mapping as a tool for collaborative land-use planning and is involved in drafting the district regulation on Kajang Indigenous People.

Teras is an NGO based in Kendari, Southeast Sulawesi. Founded on 17 March 2007, Teras aims to improve the well-being of Southeast Sulawesi communities in education, economics and conservation. Teras has been strengthening local institutions to better manage small wild-honey enterprises and facilitate multistakeholder processes to solve conflict in protected areas and develop collaborative management plans.

Preface

Between 2000 and 2009, Sulawesi lost 15.58% of its forest cover. Major causes included development activities, such as mining and agricultural intensification. To support efforts to maintain important ecosystems while simultaneously improving the livelihoods of the local people, the Forestry and Agroforestry in Sulawesi: Linking Knowledge and Action (AgFor) project aims to facilitate government and outside agency support for local communities which provide ecosystem services through payments/rewards for ecosystem services' schemes (P/RES). In order to learn from previous projects and others' experiences, avoid similar mistakes and critically assess what mechanisms would be applicable at AgFor sites, research was conducted through two parallel studies: 1) review of factors contributing to the success and failure of PES and RES in other programs; and 2) qualitative identification of the actual meaning and values of forest ecosystem services for local communities, and motives and practices to (or not to) preserve the forest. The results of both studies feed into collaborative planning of natural resources and ecosystem services management and formulation of types of support. This paper summarizes the key findings and results of these two studies.

Keywords

Community forest, cultural services, traditional knowledge, beliefs, taboos, rewards for ecosystem services

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Agroforestry and Forestry in Sulawesi: Linking Knowledge with Action project is implemented by the World Agroforestry Centre (legally constituted as the International Centre for Research in Agroforestry/ICRAF) in partnership with the Center for International Forestry Research, Winrock International, National Development Planning Agency of Indonesia (Badan Perencanaan dan Pembangunan Nasional), Operation Wallacea Terpadu, Universitas Hasanuddin, and local non-governmental organisations, governments and communities. AgFor is supported by a Contribution Arrangement (no. 7056890) with the Government of Canada, represented by the Minister of International Development, acting through the Department of Foreign Affairs, Trade and Development.

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1. Background

Between 2000 and 2009, Sulawesi lost 15.6% of its forest cover (FWI 2011). Agricultural intensification and mining have led to rapid conversion of Sulawesi's natural ecosystems, threatening the island's unique and endemic biodiversity. To protect Sulawesi's biodiversity and promote human well-being, a better articulation of sustainable natural resource management and economic development are required (ICRAF and CIFOR 2009).

The Agroforestry and Forestry in Sulawesi: Linking Knowledge with Action (AgFor) project aims to:

> *Secure **sustainable livelihoods** (food, income, protection from 'natural' disasters) for smallholder farmers and protection of natural capital in dynamic landscape mosaics (forest, agroforestry and intensive agriculture) responsive to economic, environmental and policy changes, through the adoption of diverse high-value tree crop systems and governance mechanisms that enhance natural resource management and environmental services in Sulawesi (ICRAF and CIFOR 2009 p.2).*

Activities to enhance natural resource and ecosystem services management focus on 'improving understanding for both governments and communities involved in the planning process of the links between gender roles and needs, types of land use, spatial patterns and ecosystem services' and 'facilitating support by governments and outside agencies of local communities—both men and women—who provide ecosystem services'. These activities should be based on sufficient understanding of what actual and potential 'ecosystem services' are in place, who 'provides' the ecosystem services, what types of 'support' are needed and in what ways the support could achieve conservation and livelihoods' objectives.

In the last few decades, the dominant approach to better protect ecosystem services has been economic valuation and payment, that is, payments for ecosystem services (PES), which is associated with utilitarian views (O'Neill et al 2008). Such an approach assumes that ecosystem services are neglected in decision making because they are not (economically) valued, leading to loss of biodiversity and ecosystems (TEEB 2010). This assumption should not be generalized as motives to (or not to) preserve ecosystem services are contextual and vary across sites. The other streams of literature propose rewards for ecosystem services (RES) to suitably acknowledge those who have provided or protected non-marketed ecosystem services.

PES, RES or other mechanisms might work well in some cases but not in others. To learn from previous projects and others' experiences and critically assess what mechanisms would be applicable at our sites, we conducted two parallel studies: 1) review of factors contributing to the success and failure of PES and RES; and 2) qualitative identification of key ecosystem services of forests in the AgFor sites, including related stakeholders and institutions. The results of both studies can be fed into collaborative planning of natural resource and ecosystem services management and formulation of types of support. This paper summarizes the key findings and results of these two studies.

2. Definitions and methods

In this research, the term 'ecosystem services' is defined as 'the conditions and processes through which natural ecosystems, and the species that make them up, sustain and fulfil human life' (Daily 1997 p. 3). This definition emphasizes the importance of all interconnected ecological conditions, processes and roles of species that compose them. Ecosystem services are grouped into four categories: provisioning, regulating, habitat[1] and cultural services (MEA 2005, TEEB 2010). Numerous alternative definitions, categories and methods have been proposed by scientists to better recognise social and cultural values (for example, Boyd and Banzhaf 2007, Chan et al 2012, Farber et al 2002, Fisher et al 2009, Norgaard 2010), however, we found that TEEB's classification is the most practical to communicate with a broad audience and is aligned with the objectives of this research.

As part of the study to produce output #510, we collected the following data: the forest's key ecosystem services from the local people's perspectives, and key stakeholder and institutional arrangements of these 'services'. The methods comprised semi-structured in-depth interviews, combined with participatory rural appraisal techniques. We used focus-group discussions, participatory village sketches and narrative walks, focusing on the following questions: (a) what do local people think and feel about the forest; (b) how important is the forest for their lives and livelihoods; (c) if the forest is important, is anything done to protect it, by whom and whether the importance of the forest is translated into land-use systems.

Quantitative analysis of qualitative information was also performed, to analyse similarities and differences. Information and data were analysed and recategorised following the Millennium Ecosystem Assessment (MEA 2005) and TEEB (2010) categories, that is, provisioning, regulating, habitat and cultural services, including their subcategories (see Table 1). From this data we gave scores of 0–9 for the conditions at each site where 0 indicated none, 1–3 low, 4–6 medium and 7–9 high. The scores were then analysed using Principal Coordinate (Component) Analysis.

[1] TEEB (2011) proposed modification to ecosystem services' categories, in particular specifying 'habitat services' as a separate category and incorporating 'supporting services' into 'regulating services'.

Table 1. Categories and sub-categories of ecosystem services

Category (in this research each scored in the range 0-9)	
Forest-cover change based on key actors' perceptions	
Provisioning services	• Local people's dependency on the forest (for subsistence): o Wild forest food (fruits, spices, wild honey, ferns etc.) o Medicinal plants o Fibre and resin (rattan etc.) o Timber o Water
Regulating services	• Regulating or influencing: o Water quantity and quality o Crop production o Minimizing pests o Reducing wind speed
Habitat services	Habitat for wildlife, plants, pollinators, seed dispersers etc.
Cultural services	• Cultural-social meanings of forest as: o Local identity, sense of place o Traditional/cultural beliefs, taboos, norms to conserve forest o Local knowledge (of the function of plants for medicine, fertilizer, pesticides, hydrology, seasonal variations, wildlife, their behaviour and habitats) o Materials for customary rites o Amenity/aesthetic values
Social structure categories	• Institution: o Local institutional capacity o Local leadership
	• Is there a self-organized best practice(s) that maintains ecosystem services performed (a) individually and/or (b) collectively? • If yes, has the best practice been adopted by all villagers?
	• Economics: o Income from forest products o Access to markets (scored 9 for easiest access) o Expectation of economic benefits from forest
	• Gender dimensions: o Different interests of women and men in natural resource and forest management o Different roles o Different knowledge
	• Length of residence (scored 9 for longest)
	• Negative perceptions concerning the legal status of the forest

Source: adapted from MEA (2005) and TEEB (2010)

3. Sites

This paper covers key findings from the first 12 locations of the AgFor project: Campaga, Bonto Tappalang, Labbo, Kayu Lo'e, Tana Toa and Borrong Rappoa in South Sulawesi; and Ladongi, Simbune, Tawanga, Asaki, Wonu-ahoa and Tahura Nipa-nipa in Southeast Sulawesi. Demography, geography and governance issues are briefly described in Table 2.

Table 2. Summary of site characteristics

District	Site	Population in legal settlement		Ethnic group	Main income	Topography	Extent of forest (ha)	Status of forest	Governance issues
		Male	Female						
Bantaeng (South Sulawesi)	Bonto Tappalang	602	672	Makassarese	Horticulture	Hilly, 800 masl.	80,000	Village forest	Part of Bonto Tappalang Forest was included in Labbo Village Forest, resulting in Labbo monopolizing management, programs and funds.
	Labbo	1445	1554	Makassarese	Coffee and cacao	Hilly, 1200 masl.	260,000	Village forest	Weak local institution managing the village forest.
	Campaga	923	967	Makassarese	Coffee and cacao	Hilly, 500 masl.	23.68	Sacred forest, granted village forest status	Weak local institution, PES ideas from the elites lead to elite capture, conflict and commodification.
	Kayu Lo'e	759	842	Makassarese	Horticulture	Hilly, 500–700 masl.	264,000	Protection forest and production forest	Unclear/overlapping land status. To solve land claimed by communities, proposed HKm, but delineation was not based on spatial data or ground verification.
Bulukumba	Tana Toa	1953	2247	Kajang	Horticulture	Flat, 200 masl.	331.17	Customary forest but categorized by the state as limited production forest	Kajang customary forest was delineated as 'limited production forest'.
	Borrong Rappoa	2072	2088	Makassarese	Coffee, cacao, clove	Hilly, 600–1200 masl.	Community Forestry scheme (Hutan Kemasyarakatan/HKm) 465 ha based on district forestry service; 450.81 ha based on HKm members' claim.	Protected forest proposed for HKm	Protection forest vs. community/people's orchard(s). To solve, proposed HKm, but there is distrust between locals and government.
Kolaka Timur	Ladongi	1976	1957	Balinese, Javanese, Bugis	Horticulture and agriculture, coffee, cacao	Flat, 90 masl.		Protected forest, but allocated for industrial plantation	Logging backed by some elites and powerful people is thought to have reduced water supply and quality.
	Simbune	436	379	Tolaki	Agriculture coffee, horticulture	Hilly, 200 masl.	Approx. 100 ha	Protected forest, but allocated for industrial plantation	Overlapping claims of State Production Forest, people's gardens and NTFPs, and PDAM monopolizing water sources.

District	Site	Population in legal settlement		Ethnic group	Main income	Topography	Extent of forest (ha)	Status of forest	Governance issues
		Male	Female						
	Tawanga	324	337	Tolaki	Cacao, wild honey, NTFP, ferns, home garden fruit	Valley surrounded by hills, 350 masl.	Approx. 500 ha	Protected forest	Protection forest, illegal/ legal logging– permit but logging in different place.
Konawe	Asaki	544	534	Tolaki, Makassarese	Cacao, home garden fruit, timber from forest	Hilly, 500 masl.	Approx. 175 ha	Upstream protected forest, lower production forest overlapping claim with people's orchards. Process to propose HKm	Logging backed by village head and police/military.
	Wonu-ahoa	391	383	Tolaki, Bugis	Cacao, home garden fruit	Hilly, 500 masl.	Approx. 100 ha	Idem	Idem
Kendari municipality	Tahura Nipa-nipa			17 farmer groups (Kelompok Tani Pelestari Hutan/KTPH), each with about 20 members, in: Tolaki, Muna, Buton, and Timor.	Fruit, cacao, clove	Hill, 600–800 masl.	8146 ha (tourism forest 972, limited production forest 4209, and permanent production forest 2965)	Grand Forest Garden	New manager applied people-exclusion approach, contradicting the decree on collaborative management, creating conflict and distrust.

Source: Badan Pusat Statistik (2014), Balang (2012), ICRAF (2014a, b), LepMIL (2012)

4. Results and discussion

4.1 Review of ecosystem services reward schemes

Key literature that analyses the successes and failures of P/RES and community-managed forests, in general, conclude that the excessive focus on economic valuation fails to achieve the primary objectives of the ecosystem services model. The failures were mostly caused by mismatches among ecology-economic-social theories and methods, demonstrated, for example, in contradictory interpretations of 'values' and 'benefits' of nature for human well-being. Ecosystem valuation frameworks focus too much on economic theories and fail to address human values, ideals and behavioural diversity. Further, inappropriate payment mechanisms have caused counter-productive effects such as conflict and commodification of common pool resources (Agrawal 2002, Chan et al 2012, Cornell 2011, Daily et al 2009, Farber et al 2002, Fisher et al 2010, Gómez-Baggethun and Perez 2011, Ibarra et al 2011, Leimona et al 2010, Muradian et al 2013, Norgaard 2010, O'Neill et al 2008, Robertson 2004, Spash and Vatn 2006). Muradian (2013) suggested that the chances of counterproductive effects are higher 1) when the conditions for the payments are seen as an external imposition; 2) when the payments are perceived as undermining trust (perceived as a threat); and 3) when the tasks at stake have an important component of moral obligation or contribution to the common good.

Specific to P/RES reviews in Indonesia and Asia (Leimona and Joshi 2009, Leimona et al 2010, Pirard and Billé 2010) and in Sulawesi and West Kalimantan (Yuliani et al 2014), we conclude the following inter-connected factors have contributed to the failures or ineffectiveness of P/RES:

1. Lack of understanding of the key stakeholders involved, that is, participating local people, NGOs/intermediaries, government and external programs, regarding:
    a. What P/RES actually is, different types of rewards and different contexts where P/RES is appropriate.
    b. What processes and conditions must be met to achieve the expected environmental and livelihood outcomes. 'Processes' that should be met include participatory identification of key ecosystem services and ecosystem services reward schemes/models, voluntary participation in the scheme, negotiation based on free, prior and informed consent and sufficient knowledge of the local context. 'Conditions' include measurable outcomes and clear property rights, participatory development of mechanisms to achieve conservation and livelihood objectives, etc.
    c. What will be the implications of participating in P/RES schemes for livelihoods and land-use practices?
2. Inappropriate institutional arrangements, weak governance and unclear management of funds leading to elite capture, cronyism, unequal benefit sharing and high transaction costs.
3. Overreliance on a utilitarian approach and inappropriate assumptions, which fail to consider the importance of cultural ES, weaken traditional knowledge systems and are thus counterproductive to the intended objectives.

4. Actual links between land-use practices under the P/RES scheme and provisioning of ecosystem services (for example, water supply) remains unclear for scientists and local people.

5. Lack of processes for Indonesian key stakeholders to critically learn from past experiences, and the limited number of studies and literature that analyse P/RES in Indonesia from social and cultural perspectives. The low number might be caused by a lack of attention to cultural services, as aligned with Chan et al (2012 p.9): 'Cultural and "non-use" values are included with ecosystem services in all prominent typologies (Costanza et al 1997; Daily et al 1997; De Groot et al 2002; MEA 2005), but in practice they have received little attention in the growing body of empirical ecosystem services research'. Decision/policy makers, development agents/practitioners, NGOs and other external actors tend to directly adopt and replicate PES models without knowing the weaknesses and factors required for success. Consequently, P/RES schemes can replicate failures, as in the Campaga case reported below.

Despite the general challenges, some P/RES schemes in Indonesia have achieved positive 'intermediate outcomes', mostly indirect and non-financial, for example, expanded social networks and increased human, social and physical capital. In the Danau Sentarum area in West Kalimantan, local communities who have protected the Nung Sacred Forest were rewarded with a prayer house by the district government. The people remain very proud of their prayer house and their forest. Local people living downstream of the Wanggu watershed, Southeast Sulawesi, rehabilitated their land with fruit trees, and gave upstream villages seeds asking them to also rehabilitate their land. Yet further investigation is required to assess if such outcomes will lead to positive environmental and livelihood impacts (Leimona et al 2010, Pirard et al 2014).

To enhance natural resource and ecosystem services management, we need to develop more comprehensive and holistic approaches that 1) embrace social and cultural meanings of ecosystems; 2) address the linkages and feedback mechanisms between social-ecological systems; 3) are implemented on a rational scale; and 4) appropriately consider different kinds of motives behind peoples' actions and decisions. Ryan and Deci (2000) describe two broad categories of people's motivations: intrinsic and extrinsic. Muradian (2013) uses these to distinguish among rewards, incentives and markets in the management of ecosystem services as they have different goals and convey different social meanings. Therefore, to minimize unintended negative impacts, we need to properly acknowledge those distinctions and the applicability of each type in different contexts (Muradian 2013):

- *Reward*s are meant to acknowledge past performance as a way to 1) give social recognition; 2) encourage future good performance; 3) induce other users of the resource base to follow similar practices; and in some cases 4) work as a social transfer to vulnerable social groups (contribution to rural economic development). Rewards, as used here, tend to rely on intrinsic motivations, that is, psychological drivers of behaviour that do not depend on external stimuli.

- In *market-based transactions*, 'ecosystem service providers' rely heavily on extrinsic motives and will not undertake the concerned activity (for example, protecting the forest) without payment.

- *Incentives* combine characteristics of markets and rewards, which work well when there is a combination of extrinsic and intrinsic motivations to undertake the promoted activities.

Rules, modalities of intermediation and participation, fund collection, and conditions and payments, are all elements that can differ in accordance with the local context (Pirard et al 2014). Most of the important ecosystem services in Indonesia are managed as Common Property Resources (CPR), therefore, P/RES might operate better if it was applied on a smaller scale and used other principles for sustainably self-governed CPR as described by Ostrom (1990) and Agrawal (2002). Non-monetary P/RES, for example, rewards and incentives, might achieve conservation and livelihood objectives more efficiently if their aims were to promote collective action (Muradian 2013) or community-based conservation (Berkes 2007), or to link the community to various types of capital (human, social, natural, physical and/or financial) (Leimona et al 2010). Such non-monetary rewards might include access to quality species and germplasm, technical training in agroforestry/farming systems management, as well as support in marketing (Roshetko et al 2007). However, technical training by itself is not sufficient; it needs to be embedded in the attempts to improve governance systems and adapt these to local needs and conditions. This shows the importance of coordination and collaboration among the different project components.

4.2 Study on local land-use systems and ecosystem services

To translate the above lessons and proposals into practice, we conducted a study on local land-use systems and ecosystem services with the following objectives:

- to document local land-use systems, including reasons and motives behind land-use decisions;
- to understand the meanings of forest ecosystems (including key ecosystem services) for local communities, and local governance structures (boundaries, institutions, rules, knowledge, etc.) managing the ecosystem and/or services.

Local land-use systems

This section summarizes land use in the project sites regardless of the tenure or ownership status of the land. Ownership status and related forest governance issues are reported in a series of policy briefs (see Moeliono et al 2015a, b, c and Workman et al 2015).

In Labbo, Bonto Tappalang, Kayu Lo'e, Borrong Rappoa, Tana Toa, Asaki, Wonu-ahoa, Tawanga, Ladongi and Simbune, people use land mostly for agroforestry (coffee, cacao and clove), mixed gardens (crops with some intercropping with fruit or other commodity trees) and horticulture (open fields planted with perennial vegetables and tubers). Planting and harvesting perennial vegetables and tubers loosen the soil particles and are therefore inappropriate for steep slopes. Attempts to minimize soil erosion have been minimal with only 1–2 farmers using the terrace system.

Decisions on types of commodities to plant largely depend on the market, government development programs and benefit-sharing programs with private companies. Women add another criterion, that is, commodities that do not require too much time or physical power to maintain because women in these systems have the primary responsibility for childcare and other domestic duties.

Some villagers in our research sites, except in Tana Toa and Tawanga, have established orchards in forest areas. In Labbo and Bonto Tappalang the villagers are fully aware of the forest boundaries and that opening the forest can lead to them being categorized as 'encroachers' (see Moeliono et al 2015b). But, those in Kayu Lo'e, Borrong Rappoa, Asaki, Wonu-ahoa, Ladongi and Simbune claim that their orchards are located on private land inherited from their parents or bought from someone

else. In other cases, local people reported that the forest boundaries had expanded and now include private land.

The people of Campaga use their land mostly for wet-rice fields and agroforestry (coffee and cacao). There have been some attempts by a few people, especially those who have traditional knowledge, to minimize erosion. Steep slopes and riversides are planted with trees that are believed to have the capacity to 'adsorb water' and 'bind soil', for example, 'karoci' (*Ficus* sp.) and 'pangi' (*Pangium edule*) trees. In Tahura Nipa-nipa, the farmers mostly plant clove, cacao and fruit trees.

Ecosystem services reward schemes in accordance with the meanings of forest for local people

As described earlier, understanding people's perceptions and motives to (or not to) preserve important ecosystems is critical for designing reward mechanisms. Our study shows that local communities in all our study sites have a similar perception that the forest plays a critical role as a source of water for domestic purposes and micro-hydropower. In some sites, the local communities had already developed collective action or local institutions to manage their water as a common pool of resources before AgFor started.

Despite the similar views concerning the roles of the forest in providing water, the meaning and values of forest ecosystem services for local communities, and motives and practices to (or not to) preserve the forest varied across our study sites. However, they can be clustered into three groups (Figure 1) as follows:

1. People who have been protecting the forest and water for generations based on traditional beliefs, taboos and customary rules: motives are purely intrinsic. Campaga and Kajang in South Sulawesi, and Tawanga in Southeast Sulawesi fall into this category.

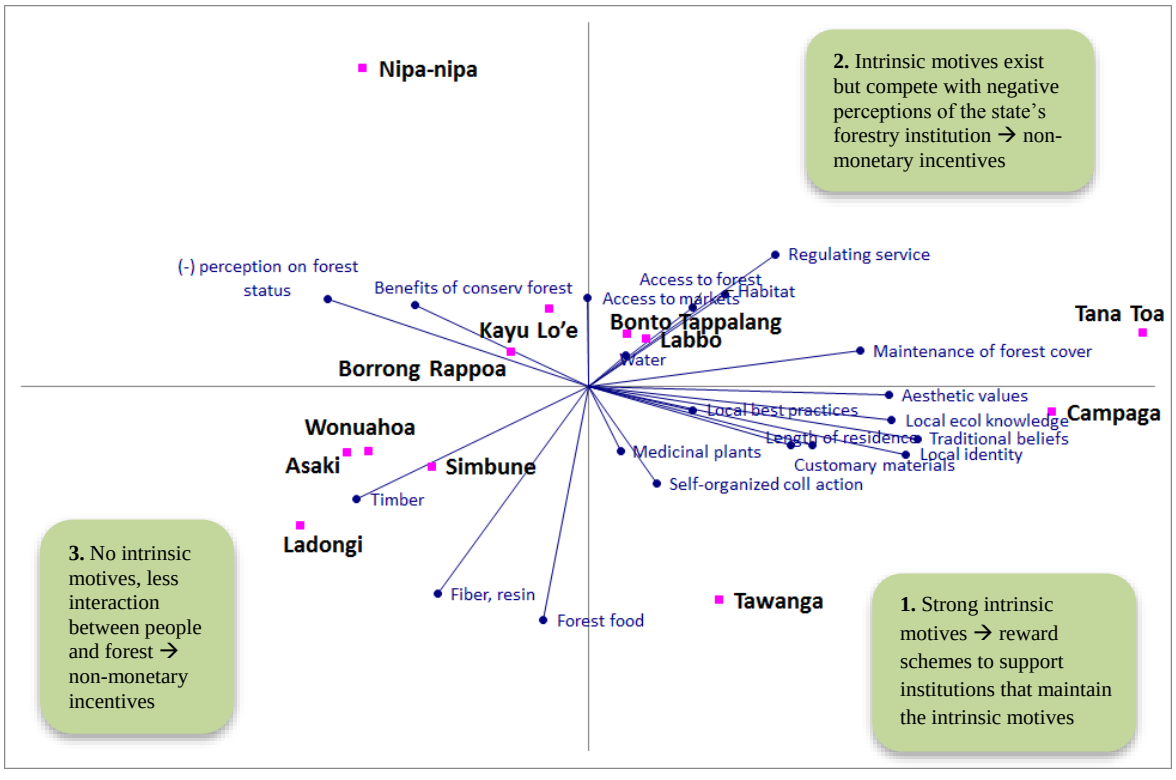

Figure 1. Principal Coordinate (Component) Analysis of local people's perceptions of forest ecosystems

In *Campaga*, the most important roles and meanings of forest are water, sacredness and local identity. The local community perceive springs and their water as 'gifts from God,' which should be used for people's lives, especially for the poor and are therefore considered sacred. They also believe that the forest and water must be preserved, and used for people's livelihoods, especially for poor farmers downstream. Cutting trees, using logs from fallen trees, urinating and/or defecating in or altering the springs and water canals are completely forbidden. The Campaga villagers strongly associate the forest with their local identity, and believe those who break the taboos will be cursed and might even suffer fatal accidents. Local people from outside Campaga also obey and respect these taboos.

The intrinsic motives of the local people were disrupted by the change in status and PES ideas introduced by external institutions. In 2010, the forest was granted Village Forest (Hutan Desa) status and managed by BUMMAS (formal village enterprise). External institutions promoted the Hutan Desa idea, based on utilitarian and over-generalization of views, that is, to better protect the forest. With formal status local people would receive economic benefits from the forest, for example, through water payments and tourism. Our study shows that these ideas have triggered horizontal conflict, distrust and elite capture and they contradict the local people's intrinsic motives.

Kajang is an indigenous community of South Sulawesi where people still maintain a traditional life based on traditional rules called 'pasang'. They have several patches of sacred forest with the largest (331.2 ha) located in Tana Toa village. The Kajang people believe that human history began in this forest and that the forest is a source of life and should be protected. Only the customary leaders can access the core part of the sacred forests (Borong Karama') and use materials from the forest for traditional rites. Again, this shows a strong intrinsic motive to protect the forest. However, in 1997, the government gazetted the forest as a State Limited Production Forest for timber production. This contradicts customary rules and could be classed as a violation of indigenous people's rights.

In *Tawanga*, the community follow traditional norms and maintain local knowledge more than formal rules concerning the forest. They do not cut trees because of taboos (for example, sacred trees and groves) and combined with local knowledge that the forest is needed to 1) prevent floods and landslides; 2) maintain water supply for irrigation and micro-hydropower; and 3) maintain NTFPs, for example, wild honey and ferns, the forest is protected.

Having strong intrinsic motives, Campaga, Kajang and Tawanga communities do not require external pressure to protect their ecosystems. Rather, they need support to strengthen customary rights, traditions and local institutions. Therefore, the AgFor governance team focused on facilitating collective action and strengthening local institutions such as the ecosystem services reward schemes, in particular in:

- Campaga: identifying and strengthening the right local institutions to manage the forest and facilitating collaborative planning processes for the forest that comply more with sociocultural rather than monetary values;

- Kajang: multistakeholder processes to develop a district decree (Perda Adat) to formally recognise the rights of Kajang indigenous people including their customary rules and sacred forests;

- Tawanga: capacity building on wild honey production and post-production techniques, marketing and networking; and strengthening the women's group that collects and sells ferns for additional income.

2. Local people have negative perceptions of formal forestry institutions, but in parallel they also develop local knowledge and practices to maintain some ecosystem services, particularly soil and water, because they have orchards inside the forest. They (individually) use local knowledge and best practices to maintain soil fertility and water supply to irrigate their orchards. They argue that their orchards have better tree cover than some parts of the State's forests that have been cleared and abandoned by the forestry service. Sites belonging to this category are Borrong Rappoa, Kayu Lo'e, Labbo and Bonto Tappalang in South Sulawesi, and Tahura Nipa-Nipa in Southeast Sulawesi. For this category, we began with a crucial question: who should be supported? Those who have orchards inside the forest (but legally categorized as encroachers and our activities could be misinterpreted as supporting forest encroachment) or those who do not have orchards in the forest? To ensure equity, we decided to support both and focused on a non-monetary incentives scheme, grouped under three categories:

    - For those who have orchards inside the forest the incentive schemes were developed to motivate them to continue individual best practices but to stop clearing more forest. Activities focused on multistakeholder meetings and workshops to:

        a. Revive relations, trust and collaborative management among key stakeholders of these sites. In Tahura Nipa-nipa, we focused on facilitating a collaborative management agreement.

        b. Formulate a management plan for the village forest that is more participatory, has more equal benefit-sharing and could meet conservation and livelihood objectives (for example, as oppose to previous village forest management plans for Labbo, Bonto Tappalang and Campaga, which were marred by elite capture).

    - For those who do not clear forests, the incentive schemes were aimed at motivating them to rehabilitate degraded steep slopes, while also protecting the remaining forest. Activities included:

        a. Participatory village land-use planning focuses on choosing the right (local) species that are ecologically appropriate for rehabilitating degraded steep slopes and are also socially and economically viable. The plan is now being put into a proposal to obtain support from the district government in the form of seedlings and other means.

        b. Training workshops on terracing and other best practices to minimize erosion: the district government indicated that local people who perform conservation practices will be given incentives, for example, in the form of seedlings.

3. Local people do not have intrinsic motives and are less dependent on forest resources. They only need secure access to their orchards 'inside' the forested landscape (Ladongi, Simbune, Asaki and Wonu-ahoa). We facilitated meetings between the government and local people and discussed various possible solutions including incentives or compensation for those who are willing to be relocated. This option did not work due to the unclear tenure and boundaries.

After a series of meetings and workshops, the government and local people in Asaki and Wonu-ahoa agreed to propose the HKm scheme, while in Ladongi and Simbune the focus was on strengthening local institutions (Forest Management Unit/KPH) and village members on collaborative forest management.

5. Concluding remarks

The RES schemes are aimed at strengthening institutions at various levels to manage forest ecosystems (and services) collectively, through various entry points or themes: micro-hydropower, village forest (Hutan Desa/HD) planning and management, community forestry (Hutan Kemasyarakatan/HKm) permits, collaborative management agreements and district regulations recognising the rights of the Kajang indigenous people. All these themes include 'bottom–up' processes, multiscale institutional negotiations, and participatory mapping and data verification (see Moeliono et al 2015a, b, c and Workman et al 2015). Along with these processes, we observed that RES schemes require a solid understanding of the motives and interests of local people as well as continuous reflection, monitoring and evaluation introduced through our participatory action research learning cycle. One overarching lesson, however, is that providing money as reward or incentive is generally not appropriate as this reinforces a utilitarian view and often leads to conflict over the of the fund rather than a better distribution of responsibilities.

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