

Testing the validity of a theory of change approach to
conducting a Social Impact Assessment in
Keo Seima Wildlife Sanctuary, Cambodia

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Declaration of own work

I declare that this thesis: “Testing the validity of a theory of change approach to conducting a Social Impact Assessment in Keo Seima Wildlife Sanctuary, Cambodia,” is entirely my own work, and that where material could be construed as the work of others, it is fully cited and referenced, and/or with appropriate acknowledgement given.

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List of Acronyms

CCB	–	Climate, Community and Biodiversity
CCBA	–	Climate, Community and Biodiversity Alliance
ELC	–	Economic Land Concession
FG	–	Focus group
IAIA	–	International Association for Impact Assessment
ICT	–	Indigenous Communal Titling
KWS	–	Keo Seima Wildlife Sanctuary
MoE	–	Ministry of Environment
NTFP	–	Non-timber forest product
REDD+	–	Reduced Emissions from Deforestation and Forest Degradation and from conservation, sustainable management of forests, and enhancement of carbon stocks
SIA	–	Social Impact Assessment
SMART	–	Specific, Measurable, Achievable, Reliable and Time-bound
ToC	–	Theory of Change
WCS	–	Wildlife Conservation Society

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Statement of work

All parts of this thesis are my own work (i.e. project planning, data collection, data analysis and writing up) and I was assisted in data collection by ChhengHour Veng.

Testing the validity of a theory of change approach to conducting a Social Impact Assessment in Keo Seima Wildlife Sanctuary, Cambodia

ABSTRACT

Measuring the social impacts of conservation interventions is important for accountability and adaptive project management. A popular approach to conducting impact assessments is using a theory of change (a hypothesised results chain from activities to outcomes and impact), but with rapidly changing contexts and no controls, it should be checked regularly for validity. Using stakeholder perceptions of change, I undertook a qualitative check of a theory of change in preparation for a 2017 social impact assessment of a REDD+ project in Keo Seima Wildlife Sanctuary, Cambodia, which strives to achieve social co-benefits. I undertook 2 sets of semi-structured interviews with villagers and a focus group with conservation practitioners focussing on villager goals, project outcomes and indicators and changes in context to assess the relevancy of project outcomes (for villagers to have sufficient farmland and secure and productive natural resources to support their livelihoods) and threats (population growth, deforestation, land conflict, weak institutions, limited agricultural productivity, few livelihood opportunities and climate change) and relevancy and functionality of their indicators. Villagers and practitioners reported a shift from subsistence rice farming for food and resin collection for income towards growing cash crops and illegal logging for income, supported by previous studies. The theory of change remains largely representative of the context though indicator trends in the 2017 social impact assessment need to be interpreted carefully in light of cash crops and illegal logging improving livelihoods whilst leading to decreasing availability of natural resources. A decreasing dependence on natural resources is a concern for the future validity of the theory of change and for the project achieving social co-benefits. However, with new funding for the project and organisational changes there is reason to be optimistic. This study demonstrates the importance of undertaking qualitative checks for social impact assessments and to facilitate adaptive project management.

Key words: causal model, theory-based evaluation, qualitative assessment, REDD+, social co-benefits, stakeholder perceptions, Seima Protection Forest

INTRODUCTION

Within conservation there is increasing recognition of the importance of monitoring and understanding social changes (Stem et al. 2005; Wilder & Walpole 2008). Social Impact Assessments (SIAs), defined as “the processes of analysing, monitoring and managing the intended and unintended social consequences, both positive and negative, of planned interventions...and any social change processes invoked by those interventions” (International Association for Impact Assessment [IAIA] 2003), are important to undertake for accountability to project beneficiaries and donors (Whitehouse 2005) and for increasing the likelihood of success through informing adaptive project management (Richards & Panfil 2011a).

Social impacts are long term changes that affect people in a wide variety of ways – from how people live, work and interact and their norms and values, to their community’s character and the environment they live in (IAIA 2003). In the face of such complexity, and with evaluations historically poorly executed by conservationists, practitioners have drawn upon established methods undertaken in the development, microfinance and health sectors to undertake SIAs (Margoluis et al. 2009; Richards & Panfil 2011b).

A challenge facing all SIA methods is the attribution question – how do we know the observed impacts result from the intervention and not from external factors? (Tanburn 2008). Ideally a counterfactual is established (Ferraro 2009) - for example, experimental and quasi-experimental approaches compare intervention beneficiaries to without-intervention control groups e.g. Clements et al. 2014. However, this approach is expensive and has ethical implications and it can be difficult to match the characteristics of the two groups (Richards & Panfil 2011b). Non-experimental methods, which infer the impacts of an intervention through observation, can be cost-effective alternatives

(Margoluis et al. 2009). These methods may use indicators (e.g. Sustainable Livelihoods Framework, Theory of Change approach) or not (e.g. Most Significant Change approach) and can be based on quantitative or qualitative data (Wilder & Walpole 2008; Richards 2011a; Richards & Panfil 2011b).

The Theory of Change (ToC) approach (a.k.a. the causal model or theory-based evaluation approach) has been adapted for use by organisations in multiple sectors. A ToC is a hypothesised results chain that links intervention activities, outputs and outcomes to impacts, each stage linked by a cause-effect relationship monitored by SMART (Specific, Measurable, Achievable, Reliable and Time-bound) indicators. By studying linkages in the results chain the social impacts of the intervention can be inferred (James 2011; Richards & Panfil 2011a).

Many REDD+ (Reduced Emissions from Deforestation and Forest Degradation and from “conservation, sustainable management of forests, and enhancement of carbon stocks”) projects use the ToC approach to conduct SIAs. REDD+ projects aim to preserve forests as a carbon sink, whilst companies and individuals can buy ‘carbon credits’ to offset their emissions. Implementers have a moral duty to avoid and monitor negative impacts on people and moreover, many buyers of carbon credits are interested in projects explicitly designed to achieve social co-benefits. Such projects can meet with additional standards, such as those set by the Climate, Community and Biodiversity Alliance (CCBA) which require a project to demonstrate net-positive (additional) impacts on local people through a SIA (Richards 2011b; Richards & Panfil 2011a, 2011b). The CCBA recommend the use of a ToC approach, adapted from the ‘Open Standards for Forest Conservation’ methodology (Conservation Measures Partnership 2007), for undertaking SIAs.

Without controls, the validity of a ToC relies on the model’s assumptions holding true and yet within the recommended 5 years between SIAs the project context can change dramatically in developing countries, where most REDD+ projects are based. It is also key to check for unexpected outcomes which are not included in the ToC. Hence, it is important to routinely undertake a qualitative check to test the validity of the model and use new understanding to interpret indicator trends carefully (Richards & Panfil 2011a).

In this paper I report on a qualitative check in Keo Seima Wildlife Sanctuary, Cambodia, where a national REDD+ demonstration project (established in 2008) is in place. The project aims to meet CCB Standards of achieving net-positive benefits for people in 20 villages within or close to the Core Zone of the reserve. The ToC underpinning this project and a SIA (devised and undertaken in 2012) is shown in Supporting Information. The 5 yearly SIA involves monitoring changes in quantitative and qualitative outcome and threat indicators to see if overall, villagers’ livelihoods are improving due to the project (Travers & Evans 2013). In preparation for the 2017 SIA, I undertook an assessment of the relevancy of outcomes and threats to beneficiaries and the relevancy and functionality of their indicators (summarised in Table 1), in view of stakeholder perceptions of developments in project strategy and contextual changes taking place since 2012.

Table 1. Keo Seima Wildlife Sanctuary REDD+ project outcomes, threats and selected indicators under assessment, together with amendments and additional indicators identified in this study.

IMPACT (for reference): A well-managed forest landscape that supports improving livelihoods for the people who currently live there	
Outcome*	Indicators*
Outcome 1: Sufficient, <i>secure and productive</i> farmland to support the livelihoods of current residents	<ul style="list-style-type: none"> • % people without farmland • Average area of land owned per household + <i>Average area of land in production per household</i> • Rice sufficiency and land sufficiency + <i>Income sufficiency</i> + <i>Crop productivity</i>
Outcome 2: Increase security and productivity of natural resources to support local livelihoods	<ul style="list-style-type: none"> • Number of resin trees owned + <i>% households collecting liquid resin</i> • Number of wild meat meals eaten per week per household • Reported harvest levels of other non-timber forest products + <i>Average distance to harvest resources</i>
Threats	Indicators*
Population growth and immigration	Indicators not assessed.
Forest clearance/grabbing by individuals; overexploitation; illegal logging	Indicators not assessed.
Land alienation and legal conflict/clearance for land concessions and other projects	Indicators not assessed.
Weak traditional institutions and lack of voice	<ul style="list-style-type: none"> • Levels of involvement + <i>Number of meetings during the dry season</i> + <i>Types and diversity of topics discussed in meetings</i> + <i>Number of incidents reported</i> + <i>Number of incidents reportedly resolved</i>
Limited agricultural productivity	Indicators not assessed.
Scarcity of sustainable development livelihood opportunities, on and off farm	Indicators not assessed.
Climate change	<ul style="list-style-type: none"> + <i>Reported dates of first and second rains of the year in each village</i> + <i>Average monthly temperature</i>

*Amendments/additions based on this assessment are shown with '+' and/or in *italics*

METHODS

Background

Keo Seima Wildlife Sanctuary (KSWS; formerly Seima Protection Forest) is a 2927 km² reserve composed of evergreen and deciduous forest across a gradient of flat lowlands to mountainous terrain, in Kratie and Mondulkiri provinces, in north-eastern Cambodia. The site is split into a Core Zone (1885 km²) and Buffer Zone (1042 km²), managed by the Ministry of Environment (MoE) with technical support from the Wildlife Conservation Society (WCS; Travers & Evans 2013).

The majority of people living in KSWS villages are indigenous Bunong, but there is an increasing number of Khmer immigrants from nearby provinces, resettling in KSWS due to the greater availability of land. Most people in KSWS are farmers growing rice, vegetables and increasingly, cash crops. Bunong people have traditionally depended on the forest for food, building materials and resources for sale such as liquid resin (Travers & Evans 2013). Historically, liquid resin was a main income source, and resin trees can be owned (by the first person to tap them), sold, exchanged and passed on to children (Evans 2003).

Recording stakeholder perceptions

I undertook this assessment through conducting 2 sets of semi-structured interviews with villagers (Goals interviews and Livelihoods interviews), and a focus group (FG) discussion with WCS staff who implement the REDD+ project. I was granted approval by the ethics committee of the Faculty of Natural Sciences, Imperial College London.

In the Goals interviews (n=29, 1 hour duration) I asked villagers to suggest and pairwise rank the goals (mid-long term aims/targets) they thought were important to village members, including the 2 REDD+ project outcomes (prompted if necessary), and to explain how and why they thought prompted indicators for project outcomes had changed since 2012, using a temporal reference point. Due to difficulty in ranking revealed during the pilot, goals could achieve equal rank. The FG with 8 WCS community team staff (hereafter 'practitioners'; 3 hour duration) focussed on changes in project strategy, re-establishing and ranking project outcomes and explaining changes in outcome indicators. Livelihoods interviews (n=61, 1 hour duration) were composed of 5 different interviews - 20 General, 9 Liquid Resin, 11 Other Natural Resources, 7 Land Ownership/Tenure and 14 Land Use interviews - which I undertook to understand contextual changes in more detail in order to provide supporting data for the above results and to determine the relevancy of threats and their indicators (see Supporting Information for further details). Such participatory techniques are widely used for exploratory research and are recommended by the CCBA (Richards 2011a).

The 6 study villages were chosen using expert opinion to represent the diversity within KSWS. Broadly speaking, there are 3 livelihood zones in the recent past dominated by cultivation of different crops. 2 villages were sampled in each zone – one 'accessible' village, and one more remote village – O Rona and Sre Levi in the cash crop zone, Pu Rang and Andong Kraloeng in the upland rice zone and O Char and Kmoum in the paddy rice zone (see Supporting Information for a map and description of these villages). A pilot study was undertaken in Pu Char, which lies between the cash crop and paddy rice zones, in order to refine the methods. Interviews within villages were undertaken with key informants, determined by short pre-interview profiling questionnaires. Data collection was undertaken from 24 May to 12 July 2016.

Outcomes were assessed for relevancy in terms of if they are still important for the livelihoods of villagers and outcome indicators in terms of if they still represent key aspects of having sufficient farmland (Outcome 1) or represent key natural resources which villagers depend on for their livelihoods (Outcome 2). Threats were assessed for relevancy in terms of if they are still a problem for villagers and if the REDD+ project can tackle these threats. Outcome and threat indicators were assessed for functionality in terms of their ability to adequately represent changes in outcomes or threats. I formulated results by drawing out key themes and looking for reasons for any variation on the themes, and reported the results which were best supported by the data.

RESULTS

Changes in project strategy

Discussions with practitioners showed the project strategy had not changed substantially since 2012. I asked practitioners how project activities related to objectives and the same threats and outcomes were re-established and same cause-effect linkages identified for the activities that have been implemented thus far.

Relevance of the 2012 outcomes and outcome indicators

Outcome rankings and indicator observations/trends

Outcomes

Practitioners maintained that the 2 outcomes- ‘Sufficient farmland to support the livelihoods of current residents’ (‘Outcome 1 (farmland)’) and ‘Increase security and productivity of natural resources to support local livelihoods’ (‘Outcome 2 (natural resources)’) are still pertinent objectives. The 2 outcomes were considered to be of similar importance as villagers in KSWs need both farmland and natural resources for their livelihoods.

Villager responses largely supported the views of practitioners, the 2 outcomes being equally of high importance to villagers’ livelihoods. In the Goals interview, bar Pu Rang and O Rona, the majority of respondents in each village ranked Outcome 1 (farmland) amongst the most important goals for villagers. In all villages bar O Rona, the majority in each village also ranked Outcome 2 (natural resources) amongst the most important goals (Table 2). The total number of goals ranked in these interviews varied from 2-7.

Table 2. A summary of the number of Goals interviews conducted in each study village with corresponding numbers of interviews which gave a top or bottom ranking for each of the 2 outcomes and lists of lower or higher ranking goals from these interviews.

Village	Total no. interviews	Outcome 1 (farmland)		Outcome 2 (natural resources)	
		Top Rank	Bottom Rank	Top Rank	Bottom Rank
Andong Kraloeng	5	3*	2	3*	2
Kmoum	2	2*		2*	
O Char	6	6*		5*	1
O Rona	4	2			4*
Pu Rang	8	3	5*	5*	2
Sre Levi	4	4*		3*	
		Lower ranking goals ^a	Higher ranking goals ^a	Lower ranking goals ^a	Higher ranking goals ^a
All villages	-	Market Education Healthcare Water Electricity	Market Education Healthcare Water Electricity Livestock Comms.	Education Water Electricity Livestock	Market Education Healthcare Water Electricity Comms.

*Majority of interviews within the village

^athan Outcome 1 or Outcome 2 as appropriate. Market = accessible/stable/high value market for products, Education = children have access to a good quality education/ more/improved school facilities, Healthcare = high quality/accessible healthcare, Water = secure/sufficient/accessible water supply, Electricity = secure/sufficient electricity supply, Livestock = more livestock, Comms. = maintain communication with family and friends.

Compared to the 2 outcomes, goals relating to markets, education, healthcare, water, electricity were ranked as the same, less or more important, goals relating to livestock were ranked less or more important and a communication goal was ranked more important (Table 2). Ranking depended on the accessibility and development of the village and personal situation (e.g. having a family). Access to a high value market was ranked highly in all villages because people need a good price for cash crops to support their livelihoods.

Respondents ranked Outcome 1 (farmland) highly because they depend on farming for income or (in Kmoum) food and want more farmland, greater crop productivity and diversity and better land security (reiterated by practitioners). A 48 year old Bunong male from Kmoum commented “most people are farmers – the land is their life.” Respondents who ranked Outcome 1 lowest in importance felt they already had enough (communal) land.

Respondents ranked Outcome 2 (natural resources) highly because people depend on natural resources for food (namely vegetables, bamboo and rattan) and on timber for housing and income and 5 respondents highlighted the link between forest loss and climate change which can greatly impact farming (reiterated by practitioners). Moreover, respondents were concerned about overexploitation of resources and deforestation, losing resources for the next generation. Most who ranked Outcome 2 of lowest importance (6 respondents and notably all respondents from O Rona) did so because they felt most of the natural resources have gone already due to illegal logging and clearance of the forest for agriculture.

Outcome indicators

Outcome 1 (farmland): % of people without farmland

Only 2 out of the 92 respondents in this study did not have land but both respondents were widows, suggesting that this indicator is still relevant in particular for monitoring changes affecting vulnerable groups.

Outcome 2 (natural resources)

Trends reported by respondents of Goals interviews suggested that ‘number of resin trees owned’ and ‘number of wild meat meals eaten per week per household’ are now less pertinent indicators for Outcome 2, whilst ‘harvest levels of other non-timber forest products (NTFPs)’ is relatively more important. Dependence on liquid resin for income and wild meat (animals) for food has declined in KSWs due to dramatic decreases in availability.

Practitioners and most villagers reported large declines in numbers of resin trees owned due to companies and individual outsiders cutting trees down for sale, agricultural clearance and building houses. Many noted that remaining trees are difficult to reach (very far away). A 48 year Bunong male from Kmoum stated “all the nearest trees have all been cut and trees which are further away may all be gone soon because outsiders cut them quietly”. In Livelihoods interviews, the majority of respondents reported declines in the % of villagers collecting liquid resin and a key reason for this decline was that resin trees were being cut down. Most villagers have supplemented lost income with money from farming.

Practitioners and most villagers also reported that the number of wild meat meals eaten per week per household had decreased, namely due a particularly marked decline in availability of animals (see Supporting Information for quotations) due to deforestation by villagers, individual outsiders and companies and overexploitation by outsiders and villagers. In the General Livelihoods interview, only 2 villages (O Char and Kmoum) had respondents who included hunting animals in their lists of village livelihoods.

Despite harvest levels of other NTFPs reportedly decreasing (due to deforestation and overexploitation by outsiders and villagers), this is now a relatively more important indicator. Whilst people depend less on liquid resin and animals, respondents of Livelihoods interviews reported that most people still use the forest to collect food such as vegetables, bamboo and rattan.

The role of external factors

Outcomes

In KSWS, collecting natural resources (Outcome 2) is becoming less important, and farming (Outcome 1) more important as there is a movement towards farming cash crops due to greater accessibility and hence more trader visits in villages (see Supporting Information for details). Respondents of Livelihoods interviews ranked farming cassava and cashew the most important livelihoods, above collecting natural resources (except in Kmoum, a remote village) because people can gain greater returns from investing their time into farming. Many respondents also noted that villagers illegally sell timber to invest money in their farms.

Outcome indicators

Outcome 1 (farmland)

This movement towards farming cash crops affects the relevancy of the indicators 'average area of land owned per household' and 'rice sufficiency'. The concept of having sufficient land is based on having enough land to meet annual rice consumption needs, but most people instead want to grow more and more cash crop to increase income. In villages where cash crops are dominant no area of land can truly be 'sufficient', and rice sufficiency (having enough land to grow rice for annual consumption needs) is an irrelevant measure. However, Travers and Evans (2013) suggested supplementing rice sufficiency with 'land sufficiency' in such villages, which is a proxy measure using cassava productivity and price estimates and area of land owned to infer if villagers in theory have enough land to buy rice instead.

Outcome 2 (natural resources): Number of resin trees owned

Collecting liquid resin for income is no longer seen as an important livelihood – liquid resin was not mentioned in discussion on the importance of Outcome 2 (natural resources) in the Goals interviews and for 7 out of 20 respondents who included it in their list of village livelihoods in the General Livelihoods interview, it was low ranking. Respondents reported that farming provides greater returns on invested time and effort in comparison to resin collection.

The role of illegal activities

Outcomes

Outcome 2 (natural resources)

Illegal land clearance for agriculture and illegal logging carried out by villagers and outsiders are key causes of deforestation and forest degradation, respectively, which reduce natural resource availability in KSWS. Both villagers and outsiders clear land for cash crop cultivation and cut timber because it is a relatively easy way earn a lot of money, with a market for timber in nearby Vietnam.

If illegal land clearance and logging close to villages cannot be curbed, preserving natural resources to maintain peoples livelihoods may become obsolete, as is indicated by all 4 Goals interviews in O Rona and 2 interviews in Andong Kraloeng (2 of the more accessible villages in KSWS with good connections to a national highway) which ranked Outcome 2 as the least important goal for villagers because accessible forest has been cleared and degraded. Respondents from all other study villages commented on the plight of illegal logging (Supporting Information).

Outcome indicators

Outcome 1 (farmland): Land sufficiency

Illegal logging is suggested to be a major income source for villagers so changes in land sufficiency should be interpreted with caution. For example, a lack of land to grow rice/cash crops may suggest a 'rice deficit' (i.e. insufficient land) but people may use money from timber sales to buy rice and so have enough land for their choice of livelihood.

Summary

See Table 3 for a summary of the relevance of 2012 outcomes and outcome indicators.

Table 3. Summary of relevance of 2012 outcomes and outcome indicators.

Outcome/Indicator	Ranking/ Observation/Trends	Relevancy* based on	
		External factors	Illegal Activities
Outcome 1: Sufficient farmland to support the livelihoods of current residents	Relevant	More relevant	-
% of people without farmland	Relevant	-	-
Average area of land owned per household	-	Depends on village characteristics	-
Rice sufficiency	-	Depends on village characteristics	-
Land sufficiency	-	Depends on village characteristics	Less relevant?
Outcome 2: Increase security and productivity of natural resources to support local livelihoods	Relevant	Less relevant	Less relevant
Number of resin trees owned	Relatively less relevant	Less relevant	Less relevant
Number of wild meat meals eaten per week per household	Relatively less relevant	-	-
Harvest levels of other non-timber forest products	Relatively more relevant	-	-

*'Less/more relevant' compared to relevancy in 2012. Relevancy of outcomes is assessed in terms of if they are still important for the livelihoods of villagers. Relevancy of indicators is assessed in terms of if they still represent important aspects of each outcome.

Unexpected outcomes

Lower accessibility to natural resources which support local livelihoods

In the Livelihoods interviews, respondents reported that patrolling intended to prevent illegal activities, and tourists visiting for ecotourism (in Andong Kraloeng) can deter people from legally collecting natural resources from the forest.

The former was a concern raised by respondents from all villages. It was suggested many times that patrol teams punish poorer villagers for both illegal and legal activities whilst activities of the rich and powerful are not addressed (see Supporting Information for quotations). It should be noted that 'inappropriate prevention of legal uses' and 'selective enforcement affecting indigenous people and poor Khmer users' were raised as potential negative project impacts in the ToC and prevention mechanisms have been identified (Supporting Information).

The latter concern was only expressed by one person explicitly but villagers in Andong Kraloeng in general are uncertain about where the tourists go and what they do when they go into the forest. Reportedly tourists come up to 9 times per month which could seriously affect legal resource collection.

Suggestions for 2017 outcomes and outcome indicators

Amendments and additions to the 2012 outcomes and outcome indicators based on functionality are summarised in Table 1 in italics. Details of these changes are explained in the Supporting Information.

Relevance of threats and functionality of threat indicators

Population growth and immigration

This is still a threat to villagers in KSWs. In the more accessible villages such as O Rona and Andong Kraloeng immigration is the main reason for population increase, whilst in other villages population growth may be predominantly internal. Population increase results in boundary conflicts and land grabbing (noted in O Rona in particular), and overexploitation of natural resources. Whilst the project cannot affect internal population growth, it was noted by respondents from O Chrar and Andong Kraloeng that Indigenous Communal Titling (ICT) makes it difficult for outsiders to own land and so limits in-migration.

Forest clearance/grabbing by individuals; overexploitation; illegal logging

These threats were the most widely reported by respondents, as described above. Respondents reported that if executed well, ICT and patrolling could reduce illegal logging, forest clearance and land grabbing. Practitioners reported that encouraging sustainable harvesting of resources could reduce overexploitation.

Land alienation and legal conflict/clearance for land concessions and other projects

Land clearance by companies/land concessions are a threat to all villages, felt strongest by villagers in the east of KSWs where most commercial agricultural clearance and logging has taken place. This threat can be tackled by the project – practitioners reported that developing partnerships with the private sector (a project activity) could reduce the threat and some villagers noted that ICT could in principle protect land from companies.

Weak traditional institutions and lack of voice

This is still a threat in KSWs, indeed project activities ICT and patrolling are reportedly ineffective in general due to weak leadership and community cohesion within the villages. However, respondents did not feel that the project had yet strengthened institutions/villager voice.

The results of 'levels of involvement' as an indicator should be interpreted with caution, as a low turnout is not necessarily to be associated with weak institutions and lack of voice. Even with strong institutions in the village encouraging people to attend fora, villagers may choose not to attend because they want to invest their time in farming, particularly in the wet season and feel apathetic to attend due to a large number of meetings each month. The number of meetings organised in the dry season and diversity of topics discussed should be interpreted alongside attendance records. In addition, the numbers of incidents reported and resolved should be recorded and interpreted.

Limited agricultural productivity

Respondents raised limited productivity as a problem, mainly in relation to poor fertility and a changing climate. Practitioners and villagers reported that improving the knowledge and skills of villagers can improve productivity, which the project can assist with through agricultural extension activities.

Scarcity of sustainable development, livelihood opportunities, on and off farm

Scarcity of livelihood opportunities remains a threat in KSWs – all 14 respondents who gave an answer in the General Livelihoods interview reported there being no other livelihood options outside of farming and collecting resources from the forest. The project still has the potential to reduce this threat, namely through support for alternative livelihoods e.g. community-based ecotourism.

Climate Change

The majority of respondents of livelihoods interviews reported that rain had become irregular and the temperature hotter in recent years, which many villagers associated with forest loss. Changes in climate limit agricultural and natural resource productivity. Whilst the project obviously tries to reduce this threat by retaining the forest as a carbon sink, more directly the project can aid people in adapting to climate-driven changes through agricultural extension activities and sustainable harvests of natural resources.

Discussions with respondents identified average temperature/month and the timing of the first and second rains of the year (representing regularity of rainfall) to be pertinent indicators of climate change.

DISCUSSION

Contextual changes

In this study I found that farming is still important for people's livelihoods, increasingly for income rather than for food as there has been a shift from subsistence farming of rice towards growing cash crops. Fox et al. (2008) report this trend across Cambodia generally, as the demand for cash crops increase and markets reach more villages. Recently, the export demand for cassava increased, as factories started to process it for animal feed and ethanol (Sochanny et al. 2015), whilst villages in KSWs have become better connected to markets due investments in infrastructure (e.g. national highway 76; Cheetham 2014).

I found that natural resources are still important for people's livelihoods, in particular for collecting food such as vegetables, rattan and bamboo, but this is becoming relatively less important as commercial agriculture offers greater returns. Indeed, cash crop cultivation provides a higher income than selling resources from the forest such as liquid resin (Cheetham 2014) and associated economic growth often leads to improved livelihoods in villages (Cramb et al. 2009).

This study suggests that dependence on natural resources is also declining due to deforestation and forest degradation from illegal land clearance and logging (ToC threats). Financial incentives and financial security enable and motivate people to clear more land for cash crop cultivation (Travers et al. 2015). Illegal logging is also a problem across all of Cambodia. Rich and well-connected individuals monopolise resources and corruption persists from national to village level, a significant challenge for effective law enforcement (ADHOC 2013a; ADHOC 2013b). Cheetham (2014) reported that illegal logging represents a potential threat to resin collection due to loss of resin trees and the greater profitability of timber collection within KSWs. A high rate of in-migration (a ToC threat) in KSWs exacerbates both logging and land clearance. Weak institutions (a ToC threat) also mean land clearance by migrants is not always challenged (Travers et al. 2015) and illegal logging is not well addressed.

Many respondents also reported losing natural resources such as resin trees due to land clearance by economic land concessions (ELCs; a ToC threat). In 2012, 21 companies operated in Mondulkiri, across 148,410 ha of land (Sochanny et al. 2015). Though a moratorium on new ELCs has been announced, concessions (supposedly planned before the moratorium) continue to emerge (ADHOC 2013a; ADHOC 2013b).

Overexploitation of resources by both villagers and outsiders was another key reason given for decreasing natural resource availability. Indeed, Sochanny et al. 2015 report that Cambodia has seen particularly dramatic declines in wildlife populations due to high hunting pressure and Gray et al. (2012) found large ungulate density to be below carrying capacity in north-eastern Cambodia.

Implications for 2017 Social Impact Assessment

Despite this rapidly changing socio-economic and environmental background, at present the ToC underpinning the 2017 SIA is still largely representative of the project and context in KSWs. The project strategy has not changed appreciably, both project outcomes, relating to having sufficient farmland and secure and productive natural resources, are still relevant in supporting the livelihoods

of villagers and the threats highlighted in the ToC remain important, though as is to be expected, outcome and threat indicators can be refined on the basis of functionality. Reducing villager accessibility to natural resources, an unexpected outcome of the project, can be managed through adapting law enforcement and ecotourism practices.

However, with no counterfactual, indicator trends from 2012-2017 need to be interpreted carefully in light of contextual changes. The downward trends for natural resource availability appear negative but the project may have a positive impact in limiting this decline. Moreover, overall, livelihoods in KSWs appear to be improving, largely due to increasing uptake of commercial agriculture and illegal logging, though the project plays a part through aiming to secure land for villagers. Importantly, illegal logging may represent a major livelihood strategy and, though challenging, it is important that the extent of illegal activities in KSWs be studied to inform the SIA and project as a whole.

Whilst the ToC is still broadly relevant, contextual changes represent concerning trends for the future validity of the ToC, and indeed the feasibility of the REDD+ project itself. The declining importance of preserving natural resources relative to having sufficient farmland for villager livelihoods means that protecting the forest as a carbon sink and for people (the intended win-win impact of the REDD+ project) may no longer be viable in the future.

However, there are reasons to be optimistic and opportunities for adaptation of the project. The REDD+ project has recently secured significant funding through its first sale of carbon credits, allowing more planned activities to be implemented and to improve the effectiveness of existing activities. Law enforcement in particular is important to reduce the extent of illegal land clearance and logging, but has previously been poorly executed due to a lack of resources and corruption. However, funding and a recent shift in government authorities (from the Forestry Administration to the MoE) may result in better law enforcement.

The movement towards commercial agriculture cannot and should not be curbed by the project, as it is important for development. However, the project can adapt by providing people with more incentives to preserve the forest. Project activities such as ecotourism already aim to do this and receiving community benefits directly from REDD+ funding will also help. Furthermore, the project could incorporate other Payment for Ecosystem Services projects such as providing premiums for 'wildlife-friendly' produce, expanding on an existing project in Preah Vihear province (Clements et al. 2010).

Wider implications

This study highlights the importance of regularly undertaking a qualitative check of a ToC which underpins a SIA in order to maintain the validity of the method, particularly in rapidly changing contexts. Linkages between project activities, outcomes and impacts are not well known in the conservation sector and contextual changes are difficult to predict so it is difficult to design a ToC that adequately represents a system at the start of a project (Margoluis et al. 2009; Hermans et al. 2012). However, this study shows qualitative checks can be undertaken in a rapid, low cost fashion through the use of stakeholder perceptions of change.

In undertaking SIAs, experimental or quasi-experimental methods are preferable, as they provide a counterfactual for evaluation. However, the method used must be appropriate for the resources and expertise available, and where a ToC approach is employed, qualitative checks can go part way to tackling the attribution question. Qualitative assessments can also aid attribution in other methods of monitoring impact - any indicator-based method is subject to external changes and in experimental/quasi-experimental approaches it is important to understand why observed impacts have taken place. Though responses should be interpreted judiciously due to potential biases, qualitative data can offer a rich narrative of change which can also inform adaptive management of a project. Hence, qualitative assessments are a key tool in understanding the social impact of conservation interventions.

DETAILS OF SUPPORTING INFORMATION

Appendices 1-9 - the REDD+ project theory of change (1) and details (2), a map of the study site (3), description of study villages (4), profiles of respondents (5), supporting quotations (6), details the cash crop movement (7), suggestions for 2017 outcomes and outcome indicators (8) and questionnaires and FG protocols (9) are available online. The author is solely responsible for the content and functionality of these materials. Queries (other than absence of the material) should be directed to the corresponding author.

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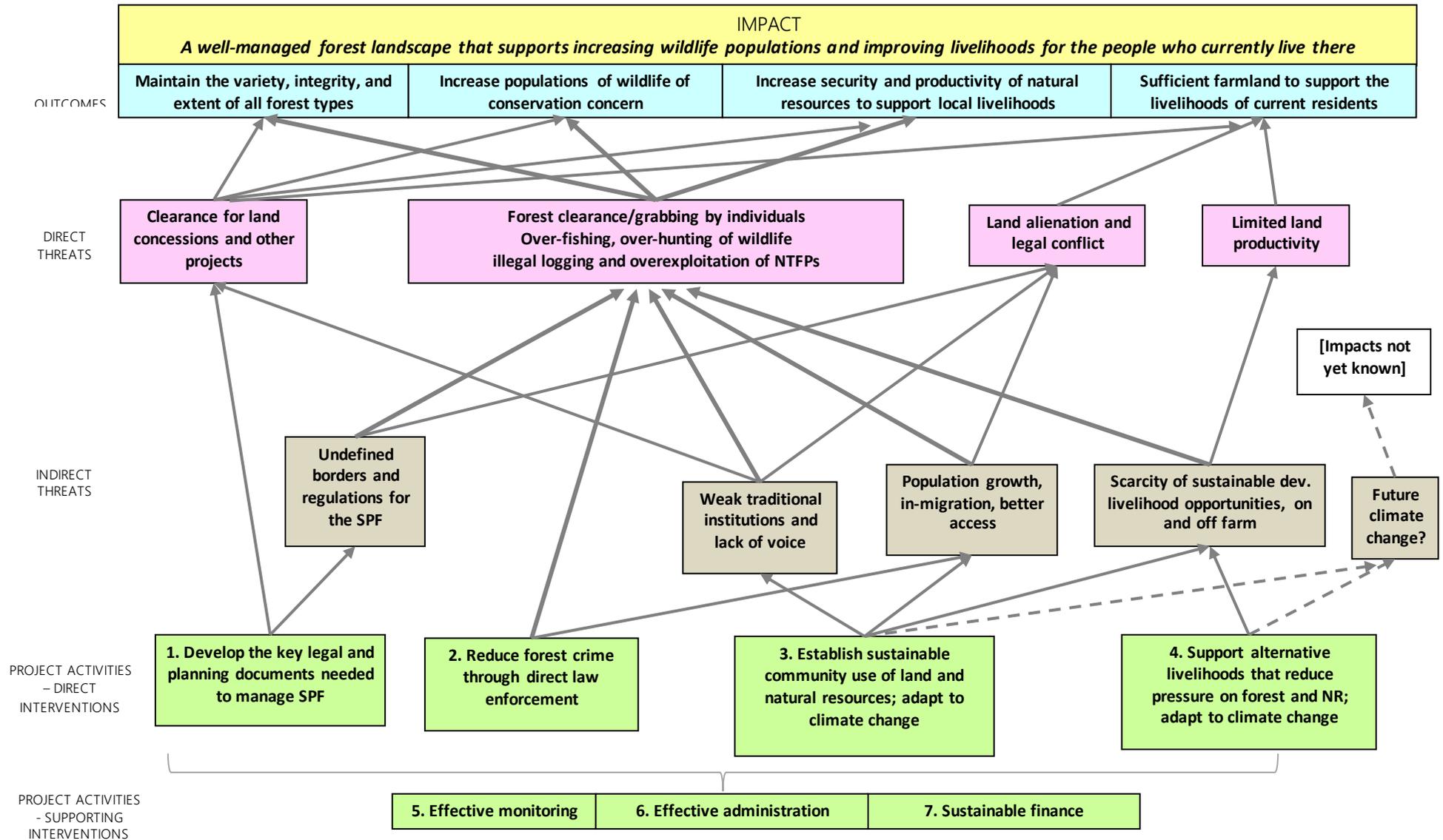
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SUPPORTING INFORMATION

Appendix 1: Theory of Change for the Keo Seima Wildlife Sanctuary Core Zone REDD+ project (with ecological objectives for completeness), adapted from Travers and Evans 2013



Appendix 2: Details of the Theory of Change for the Keo Seima Wildlife Sanctuary Core Zone REDD+ project, adapted from Travers and Evans 2013

	Projection without project	Impacts on	Projection with project	Indicator (Quant)	Method*	Indicator (Qual)	Method*
<i>CCB Core Standards</i>							
Social and economic well-being of communities; distribution of costs and benefits	Static or decline for vulnerable stakeholders; improve for less vulnerable stakeholders	Primary impact on vulnerable stakeholder groups	Improving for all stakeholder groups, including vulnerable groups	Basic Necessities Survey, basket of assets and income measures for each stakeholder group	HHS	Reported trends	Partic.
Theory of Change Target							
Increase security and productivity of natural resources to support local livelihoods	Declining security, abundance and productivity of harvested natural resources and availability of clean water	Especially on vulnerable stakeholders	Security, abundance and productivity of key resources maximised; clean water freely available to all communities	total resin tree ownership, no. meals/week/HH, reported harvest levels of other NTFPs	HHS	Reported trends	Partic.
Sufficient farmland to support the livelihoods of current residents	Increase in landlessness, static or decreasing agricultural productivity	Especially on vulnerable stakeholders	Landlessness among the poor low and stable; agricultural productivity and sustainability increasing	Land ownership measures (% landless; ave holdings); rice/land sufficiency	HHS, +LNGOs	Reported trends	Partic., LNGOs
Theory of Change threat							
Clearance for land concessions and other projects	Increasing loss to concessions	Especially on vulnerable stakeholders	Losses to concessions minimised and halted	Mapping of affected areas	GIS	Reported trends	Partic.
Undefined borders and regulations for the SPF	Continuing weaknesses in protection	Especially on vulnerable stakeholders	Borders, zones and regulations clearly defined and enforced	Mapping of demarcation, legal documentation	GIS	-	-
Population growth, in-migration, better access	Continued high in-migration, increased competition; increased conflict	Especially on vulnerable stakeholders	Population growth lower than in reference area; net in-migration negligible; access to forest areas fully controlled	Net in-migration negligible; access system excludes non-legitimate users	HHS, Demog	Reported trends	Partic.
Forest clearance/grabbing by individuals; over-fishing, over-hunting of wildlife; illegal logging and overexploitation of NTFPs	Widespread over-harvesting/clearance	Especially on vulnerable stakeholders	Illegal activities (clearance, hunting, over-fishing, hunting, logging, NTFP harvest) at very low levels	Patrol information (MIST system), independent surveys (e.g. snares, stumps), De for mapping	WCS/FA	Reported trends	Partic.

Land alienation and legal conflict	Alienation, forced sales, Uncertain tenure due to expansion outside agreed land-use plans	Especially on vulnerable stakeholders	Land alienation ceases, no land illegally occupied and subject to conflict	# of reported incidents	HHS, systematic recording of conflicts and legal tenure	Reported trends	Partic.
Weak traditional institutions and lack of voice	Seriously declined	Especially on vulnerable stakeholders	Traditional and new community institutions effective, cultural cohesion improved	Levels of involvement	HHS, committee records	CBO effectiveness self-assessment	Partic.
Limited agricultural productivity	Decline, stagnation or slow improvement	All onsite communities	Agricultural productivity increasing	Agricultural productivity indicators (e.g. t/ha)	HHS (all HH); LNGOs (target families)	Reported trends	LNGOs
Scarcity of sustainable dev. livelihood opportunities, on and off farm	Continued dependence on limited number of often unsustainable livelihoods	All onsite communities	Increasing diversity of viable, sustainable livelihood opportunities	# of livelihood activities; size of reported income sources	HHS (all HH); LNGOs (target families)	Reported trends	LNGOs
Climate change	Difficulty adapting to changes in availability of wild-harvested resources and productivity of farming systems	Especially on vulnerable stakeholders	Increased capacity to adapt to climate-driven changes	-	-	Reported trends	Partic., LNGOs

*Method:

HHS = Household survey Demog = Rapid demography survey LNGOs = Local NGOs' own monitoring Partic. = WCS/FA-led consultation workshops
 GIS = Mapping approaches such as remote sensing

	Expected positive impacts	Potential negative impacts	Most vulnerable stakeholders*	Assessment and mitigation of threats
Sub-Objective #1: Key legal and planning documents for the Seima Protection Forest and surrounding landscape are approved and implemented				
Action #1: Support for sub-decree maintained among senior levels of government and general public	recognition and protection of traditional/existing livelihoods, reduced risk from concessions, infrastructure, migration etc, improved status of key natural resources, REDD+ finance for livelihood improvement	restriction of development options	poorest, women, IP	in fact there is no significant restriction on options for community development beyond those in national law mitigation of any possible restriction of options comes from increased investment in alternative and improved livelihoods
Action #2: Management plan approved and implemented (including zonation and regulations)	clearer definition of existing rights and responsibilities, strengthen capacity of FA to implement activities/manage threats, improved status of key natural resources	zonation will potentially exclude traditional harvest activities in certain areas (to be defined through consultation)	IP, forest-dependent Kh users	this is best considered voluntary displacement of customary uses,; further FPIC will be sought for this step, risks will be countered by careful design and piloting, compensation for resin tree users, targeted provision of alternative livelihoods

Action #3: Mondulkiri Provincial Corridors strategy implemented (maintaining links to other forests)	increased involvement of provincial authorities in supporting SPF management and controlling threats	none	-	
Action #4: Develop partnerships with the private sector (to reduce impacts by companies)	reduced negative impacts from company activities	none	-	
Action #5: Develop international cross-border dialogue	reduced cross-border impacts (esp logging, illegal hunting)	none	-	
Action #6: Adaptive Management system (regular public reviews and workplans)	SPF management responds to changes in community needs/attitudes	undue representation of certain groups	-	structured, balanced forum for participation
Sub-Objective #2: To reduce forest and wildlife crime by direct law enforcement				
Action #1: Enforce wildlife, forest and protected area laws and sub-decree through patrols	effective control and deterrence of illegal activities by outsiders and community members; improved security of land and forest resources; improved general law and order situation	inappropriate prevention of legal uses, selective enforcement, over-harsh punishment, unclear rules	IP, poor Kh users	legal awareness, monitoring, training, enforcement strategies, demarcation/regulations, grievance system, regular staff reviews, strong responses to any corruption found
Action #2: Establish and implement law enforcement monitoring framework	increased effectiveness of Action#1	physical risks to informants from criminals	non-powerful people	voluntary participation, incentives not enough to motivate undue personal risk taking, confidentiality rules, adaptive management, grievance system
Action #3: Ensure sufficient patrol buildings, equipment and staffing	increased effectiveness of Action#1	buildings on community land		obtain community approval before building or seek other locations
Action #4: Ensure sufficient patrol personnel capacity	increased effectiveness of Action#1	none	-	
Action #5: Liaise with Provincial, National and other authorities	increased effectiveness of Action#1	none	-	
Action #6: Establish Community-based Patrolling and/or monitoring system	additional control and deterrence of illegal activities by outsiders and community members; improved security of land and forest resources; improved general law and order situation; jobs for community members	risk from offenders; conflict within community; legal liability	IP, poor Kh users	manage through community groups; voluntary participation, participatory approaches; coordinate with local government; adaptive management; develop cautiously to resolve legal issues
Sub-Objective #3: Land and resource use by all core zone communities is sustainable				
Action #1: Form and maintain land-use agreements with communities	increase tenure security, improve management of threats, build community cooperation/strengthen traditional systems and cultural norms	communities allocated too little land; process causes/revives conflicts or changes social dynamics; marginalised groups not accounted for	IP, poor Kh users	participatory process, safeguards for all village members; grievance process; local gov. oversight
Action #2: Legally register communities and users	increase tenure security, improve management of threats, build community cooperation/strengthen traditional systems and cultural norms	CBO formation gives too much power to some groups; individual registration excludes some users unfairly	IP, poor Kh users	participatory process (= national process for ICC, local process for user cards), safeguards for all village members; grievance process; local gov oversight

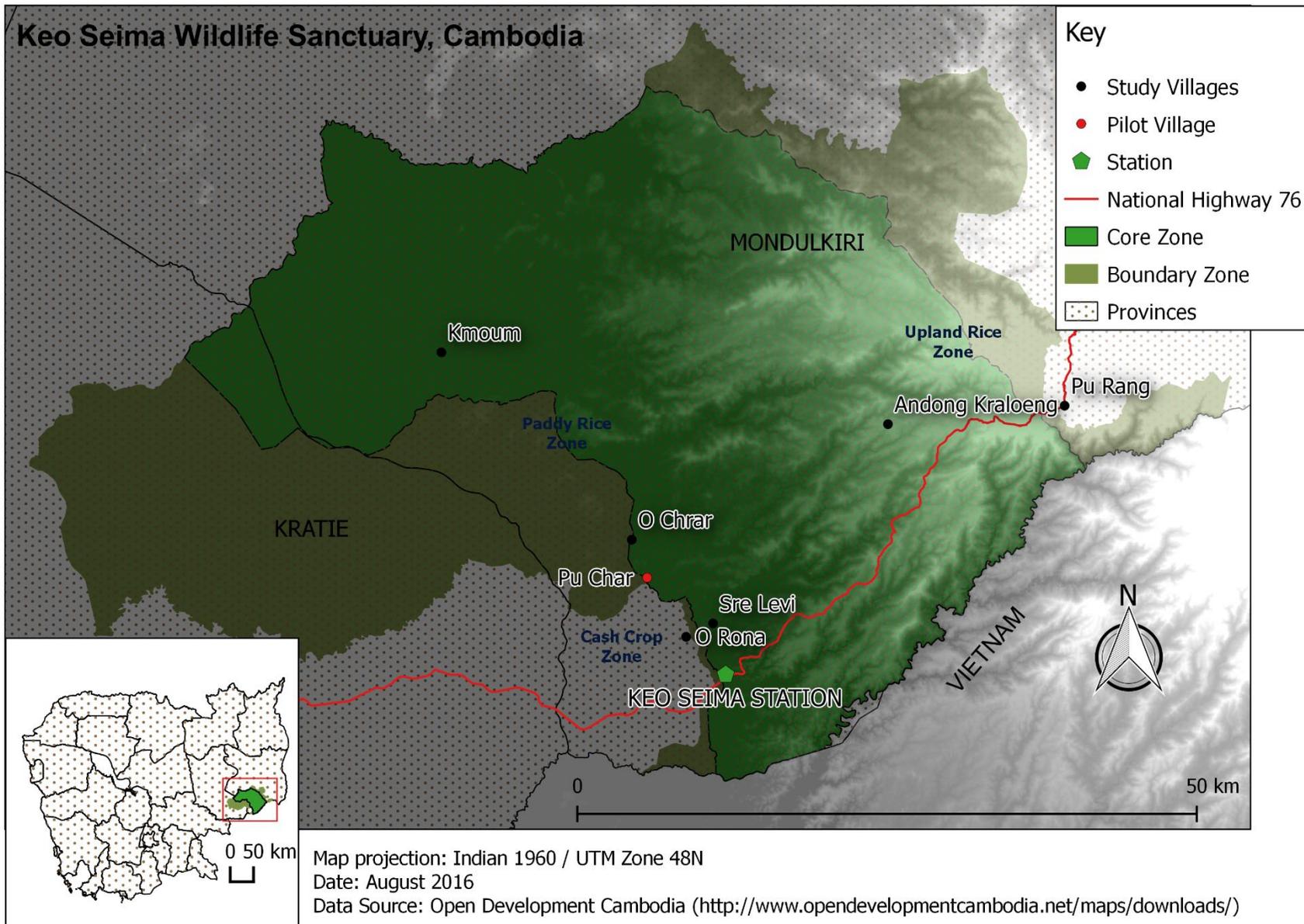
Action #3: Indigenous land titling in appropriate communities	further increase tenure security and define boundaries of carbon ownership	communities allocated too little land; process causes/revives conflicts or changes social dynamics; marginalised groups not accounted for	IP, poor Kh users	participatory process, safeguards for all village members; grievance process; local gov oversight
Action #4: Demarcation of the Forest Estate; reforestation of recent clearance	improve management of threats, clarify extent of rights (reduce risk of conflict with the law); reforestation sequesters carbon, increases supply of forest products/biodiversity and	communities allocated too little land; process causes/revives conflicts or changes social dynamics; marginalised groups not accounted for; reforestation in wrong areas	IP, poor Kh users	participatory process (see WCS/FA/MoE 2009), safeguards for all village members; grievance process; local gov oversight
Action #5: Conduct extension and communication activities	support all other activities	none	-	
Action #6: Liaise with Commune Council and other agencies	support all other activities	none	-	
Action #7: Engage with civil society organisations operating in the Project area	support all other activities	none	-	
Action #8: Ensure the capacity of Project staff is sufficient	support all other activities	None	-	
Sub-Objective #4: Support for alternative livelihoods that reduce deforestation				
Action #1: Establish sustainable timber harvests in buffer zone areas	bring forest under sustainable management, control threats, alternative and improved livelihoods	damage from logging, corruption/social conflict, inequitable benefit-sharing; business liabilities	IP, women, elderly	FA approval of management plan/ESIA; financial safeguards; participatory approach, oversight by local authorities
Action #2: Establish community-based ecotourism	alternative and improved livelihoods; incentives to change behaviour and control threats	environmental and social impacts from tourists, corruption/ social conflict, inequitable benefit-sharing; business liabilities	IP, women, elderly	environmental screening/monitoring; code of conduct for tourists and agents; participatory approach, oversight by local authorities
Action #3: Support agricultural extension activities	alternative and improved livelihoods, incentives to change behaviour and control threats	inequitable benefit-sharing, corruption	IP, women, elderly	participatory approach, oversight by local authorities
Action #4: Provide infrastructure support linked to conservation activities	alternative and improved livelihoods, incentives to change behaviour and control threats	inequitable benefit-sharing, corruption	IP, women, elderly	participatory approach, oversight by local authorities
Action #5: Develop NTFP-based livelihood projects	bring forest under sustainable management, control threats, alternative and improved livelihoods	over-harvest, corruption/social conflict, inequitable benefit-sharing; business liabilities	IP, women, elderly	FA approval of management plan/ESIA; participatory approach, oversight by local authorities
Action #6: Develop and manage a system to share carbon benefits	alternative and improved livelihoods, incentives to change behaviour	corruption/social conflict, inequitable benefit-sharing	IP, women, elderly	participatory approach, oversight by local and national authorities
Action #7: Improve literacy and numeracy	increase capacity to participate in other activities; increase off-farm livelihood opportunities	inequitable benefit-sharing	IP, women, elderly	participatory approach, oversight by local authorities
Sub-Objective #5: Collect information on long-term ecological and social trends				
Action #1: Monitoring of trends in forest cover	assess threats, measure success	none		

Action #2: Monitoring of key wildlife species	assess threats, measure success	none		
Action #3: Socio-economic and demography monitoring	assess threats, measure success/negative impacts	none		
Action #4: Facilitate research that will benefit the management of the SPF	inform adaptive management	unethical research		ensure ethical review by source institution
Action #5: Ensure sufficient staff capacity is available	support other activities	none		
Sub-Objective #6: Effective administrative, accounting and logistical procedures are in place				
Action #1: Evaluation and feedback on staff capacity, effectiveness and training needs	support other activities	none		
Action #2: Develop and maintain effective management, administrative and accounting systems	support other activities	none		
Sub-Objective #7: Long-term financial security				
Action #1: Develop and Implement REDD+ project	ensure documentation, consent and approvals to allow sale of carbon credits	covered elsewhere		
Action #2: Establish Eastern Plains Trust Fund	ensure transparent long-term sustainable management of funds	none		
Action #3: Continued support of a wide range of donor partners	maintain funding for baseline levels of protection	none		
Action #4: Increase use of commune development funds for project activities	reduce need for external funding	none		system already has many safeguards

*Most vulnerable stakeholders:

IP = Indigenous People, Kh = Khmer

Appendix 3: Map of the pilot and study villages in Keo Seima Wildlife Sanctuary, showing variation in elevation and 3 different livelihood zones within the reserve (devised on QGIS 2.6.1, using open access data from Open Development Cambodia [accessed August 2016]).



Appendix 4: Description of study villages

Though themes and trends can be drawn from villagers' responses, the predominant characteristics of each of the study villages are described here.

O Rona is only 15-20 minutes motorbike ride away from Keo Seima town along a reinforced dirt track connected to the highway. With easy accessibility to the market, cash crop (cassava, cashew, rubber, pepper) cultivation is the dominant livelihood in the village and being on the boundary of the reserve too, there has been a lot of deforestation around the village. There is a high rate of in-migration of Khmer people from other provinces in search of land and the village is now quite large (229 households).

Though Sre Levi is close to O Rona, it is relatively inaccessible due a narrow, rough and hilly road between the 2 villages. Due to the inaccessibility there is little in-migration and this village has remained small (25 households) with only 2 Khmer families. Change is much slower in this village in general but cash crops cassava and cashew (predominantly) are grown by the majority of households. People do still collect natural resources from the forest but it was noted that there is also a lot of pressure on resources from outsiders who have lost their own resources (e.g. from neighbouring villages O Rona and Sre Preah).

Pu Rang is on a mountain plateau and despite having a very good connection with the highway the village has remained relatively small (101 households) and sparsely populated. Poor quality land (leached soils) mean that rotational cultivation of crops is still practiced here and the communal land system set up by the community (independent of Indigenous Communal Titling) works effectively. Despite much of the surrounding forest having been cleared, the land is not desirable for outsiders or villagers because it is hard to farm. Villagers do still collect natural resources. Most people grow cash crops to sell to traders from Sen Monorom.

Andong Kraloeng is split into 6 settlements several kilometres apart from each other, so parts of the village are very close to the highway and others are less accessible. Deforestation is not as extensive as in O Rona, owing to the village being embedded within the Core Zone of KSWs, but is still significant in the village. For example, the road linking the largest part of the village to the highway was reinforced a 2-3 years ago but is already damaged, reportedly due to timber transportation. It is difficult for outsiders to gain land due to the indigenous communal title which villagers hold, but many Khmer people have set up businesses in the village. Again cash crop cultivation is dominant in the village and products are mainly sold to the market in Sen Monorom.

O Char is a reasonably accessible and small village (37 households) connected to O Rona by a reinforced dirt road. Cash crops were recently introduced to the village and have since become important. Almost all villagers lost their resin trees and other resources to an Economic Land Concession (ELC) to the west of the village 2-3 years ago and so frequent the forest to collect natural resources less often nowadays. There is reportedly high pressure on natural resources from outsiders from nearby villages including Pu Char.

Kmoum is the most remote study village, where the dominant livelihoods are still largely traditional. Almost all community members are Bunong and the village population is still small (80 households split into 2 settlements). People grow paddy rice rotationally for food (~1ha per household) and until recently went to the forest to collect liquid resin for income. Mainly due to companies and wealthy outsiders cutting resin trees down for timber and agriculture, many villagers no longer collect resin. A 28 year old Bunong male reported "people previously earned a lot of money from resin collection but now we've lost this income and nothing has replaced this." Traders for other crops do not yet come to Kmoum, though there are reports of villagers engaging in illegal logging to make money.

Rice is still grown in all villages as a staple food source but is now of varying importance since the introduction of cash crops. In general villagers grow 0.5 ha – 2 ha of rice (1.8 ha on average for respondents) as a minimum support for their families and then use as much land as possible to grow cash crops. In the upland rice zone only upland rice is grown but in the paddy rice zone and cash crop zone a mixture of paddy rice and upland rice is grown (paddy rice predominating).

Appendix 5: Profiles of respondents

I interviewed as many key informants as possible in the time available (3-5 days) in each village for the Goals and Livelihoods interviews. In the smaller villages, notably in Kmoum and Sre Levi, fewer people were available for interviews.

I was able to interview respondents within a wide age range in each of the villages but there is a slight bias towards to female respondents as women were more likely to be at home during the day while men were working on their farms/in the forest. Though the majority of the population of Andong Kraloeng are Bunong, I interviewed more Khmer villagers as they tended to have small businesses in addition to farms, so were more likely to be available for interviews.

Respondents	O Rona	Sre Levi	Pu Rang	Andong Kraloeng	O Chrar	Kmoum
Total number*	20	12	16	18	15	11
Age Range	19-76	18-55	21-71	20-72	18-65	23-53
Average Age	39	39	45	39	39	34
% Female: % Male	65: 35	58: 42	63: 37	61: 39	73: 27	45: 55
% Bunong: % Khmer	65: 35	67: 33	81: 19	39: 61	100: 0	82: 18
Primary occupation: % Farmer: % Other	80: 20	67: 33	31: 69	78: 22	87: 13	73: 27
Other primary professions	Chief, Shop Owner, Army, Primary School Teacher	Chief, Deputy Chief, Admin. Officer, Shop Owner	Chief, Deputy Chief, Shop Owner, Builder, Teacher, Police	Shop Owner, Teacher	Chief, Deputy Chief	Deputy Chief, Shop Owner, Teacher
Secondary occupations	Farmer	Farmer	Farmer	Farmer	Farmer	Farmer

*NB. The number of respondents do not equate to the number of interviews as some interviews were conducted with more than one household member.

Appendix 6: Supporting quotations

Declining availability of animals for food:

A 23 year old Bunong male teacher from Kmoum commented “Outsiders hunt a lot using guns and traps but villagers only use small traditional traps. By 2014 people could not even catch the forest pig any more - they try to find but cannot.”

Practitioners noted “people used to be able to catch animals from the forest (e.g. porcupine, squirrels, birds) easily but now they are hard to find.”

The extent of illegal logging:

“There is no forest anymore. Mostly people with money cut trees as they have a car to transport the timber out.” *27 year old Bunong female, O Chrar*

“Since 2013 there has been a lot of cutting. Outsiders collect timber from villagers who actually do the cutting. This is well organised – in 2013 there were hundreds of cars transporting timber out in one night.” *37 year old Bunong male builder, Pu Rang*

“Two years ago people collected timber from the forest every day for selling, but there is none left now.” 31 year old Bunong male, Sre Levi

“The village has improved because people transport timber out – it is an important source of money. Richer villagers have machines to cut and transport wood out of the forest” 24 year old Bunong female, Kmoum

Patrolling intended to stop illegal activities may cause people to stop collecting other resources from the forest:

“No-one really collects resources from the forest now, not since 2013. The conservation group does not allow people to go into forest to collect resources as they worry people go to cut timber or catch animals.” 51 year old Bunong male, O Rona

“The conservation group said we should not go to the forest and we are worried about getting arrested, even just for collecting rattan etc. People get caught for catching animals and cutting timber but also even if collecting other resources or wood to make a fire. The conservation group do not believe them!” 43 year old Bunong male, Sre Levi

“Outsiders cut big trees- these are rich, powerful people. Poorer people are scared however, though they can legally cut for building a house.” 24 year old Bunong female, Pu Rang

“When the authorities go on patrol on their own they arrest poor people who collect timber for their houses and ignore the rich. Even if villagers have a letter of permission, they rip this up and arrest people...Now people are scared and have stopped building houses.” 36 year old Bunong male, Kmoum

“Poorer people who collect food or a little resource to sell get arrested but the big traders just give money to the authorities and are let go.” 34 year old Bunong female, O Chrar

Appendix 7: The movement towards farming cash crops

The importance of accessibility

The most accessible study villages are O Rona, Andong Kraloeng and Pu Rang, which are close to the national highway (see Appendix 3). This tarmac road, which was built recently and is still in good condition, links the towns Keo Seima and Sen Monorom (the provincial capital) in the south-west near Keo Seima station and in north-east beyond Pu Rang village, respectively. These towns provide key markets for villagers, people either travelling to them to sell their products directly or traders travelling to the villages from these centres. Being so close to the border, trade is largely driven by Vietnamese buyers and most recently this trade has been in the cash crops cashew, cassava, rubber and pepper and in timber. Traders travelling to villages tend to be middle-men, offering a lower price for the products the further away the village is from the town, and traders do not visit villages which are too difficult/far to reach.

Why do people grow cash crops?

People in Keo Seima Wildlife Sanctuary (KSWS) have reportedly been growing cashew longer than cassava (on average respondents had been growing cashew for 7.4 years \pm 0.8 (SE), and cassava for 5 years \pm 0.7 (SE)), both crops being taken up when traders came to the village and risk-takers started to grow them and in more remote villages such as Kmoum, traders for cash crops have not yet arrived and introduced the crops. Cassava and cashew both grow on relatively poor quality soils (which are common in mountainous parts of KSWS) and whilst farmers can get product from cassava every year to sell, cashew is good as a long term crop, producing nuts every year for many years for selling (up to 20 years, but most productively up to 10 years). Cashew is also easy to grow, requiring little care and there is a stable price for the product. Cassava requires many inputs (e.g. labour or chemicals during growth, a lot of labour to harvest) but until recently when the price has become very cheap the outputs were deemed to be great enough for the time and effort put in. In the more accessible villages (notably in O Rona) risk-takers are also beginning to grow rubber and pepper but there is a much higher risk of losing money when growing these crops, so these have not been widely taken up.

Appendix 8: Suggestions for 2017 outcomes and outcome indicators

Outcomes

Whilst the 2 outcomes were broadly agreed to be relevant, discussions with practitioners and Goals interviewees suggest Outcome 1 should be amended (bold) as follows: sufficient, **secure and productive** farmland to support the livelihoods of current residents. Villagers stated that land security and productivity are both important for livelihoods and practitioners noted that both can be achieved through the REDD+ project through Indigenous Communal Titling (ICT) and law enforcement and educating villagers on growing crops, respectively. Particularly, if land productivity improves, villages may clear land at a slower rate.

Outcome indicators

The following suggestions are based on an assessment of the functionality of outcome indicators.

Outcome 1 (farmland): average area of land owned per household

Interviews with villagers have highlighted a difference between the potential area of farmland which is the area of land owned (for participants of a communal land title this is interpreted as equal to 5 ha which they are entitled to clear) and the area of farmland in production. On average 42.9% of respondents of the Goals interview who stated the area of land owned was unchanged added that the area of farmland in production had increased. Potential farmland and farmland in production are both useful indicators for Outcome 1 but to give meaningful results they must be distinguished, especially as communal land titling is a project activity. Both measures can be used as indicators of sufficient and secure land.

Outcome 1 (farmland): rice and land sufficiency

The results of rice sufficiency must be interpreted with caution as rice productivity is variable – on average 30.8% of respondents across 6 villages said it was variable (supported by practitioners).

Moreover, villager and conservation practitioner responses suggest land sufficiency is too crude to provide meaningful results because both the productivity (t/ha) and price of cassava have been variable over the last 4 years. On average across the 6 villages 40.6% of respondents of the Goals interview reported decreases in productivity, 11.6% reported increases and 12.5% reported that productivity was variable (reiterated by practitioners). Productivity was mainly determined by climate and land fertility (which depends on how many years the land has been in production for). Almost all respondents (19/20 people) said the price of cassava was very volatile throughout each year. People also use income from selling cashew nuts to buy rice.

If yearly income can be reliably measured, 'income sufficiency' would be a better measure than land sufficiency, asking how many years income from farming meets/falls below the cost of annual rice consumption needs. This measure accounts for variability in cassava and cashew productivity and market values, though again careful interpretation is required as people may use income from unreported illegal timber collection to purchase rice.

Outcome 1 (farmland): crop productivity

Crop productivity can be measured directly in tonnes/ha.

Outcome 2 (natural resources): number of resin trees owned

Changes in this indicator should be interpreted carefully as respondents may not be able to report resin tree ownership accurately - respondents commonly told us that they still owned resin trees but didn't visit them as often or at all, so they may not be aware of trees being cut down (a major threat). The % of households collecting liquid resin would be a good additional indicator, as it can reflect changes in numbers of resin trees remaining (security) and the amount of liquid trees are producing (productivity).

Outcome 2 (natural resources): harvest levels of other NTFPs

Harvest levels of other NTFPs would be complemented by a further indicator - 'average distance to harvest other NTFPs', as even if harvest levels reportedly stay the same, people may travel further to collect the resources when the availability has declined. In the Goals interview 4 people stated that harvest levels were the same but the distance to find resources had increased.

Appendix 9: Questionnaires and Focus Group Protocols

RESPONDENT PROFILE

Village: Date: Interview No.: Respondent No.:

Age: Gender: M / F Chief/ Deputy/Community Chief

Ethnicity: Bunong/Khmer/Other group:

Marital Status: Single/ Married/ Widow/ Widower

No. of HH members:

Details of HH:

Education:

School: Grade:

Occupation 1:

Occupation 2:

Own Land / Rent Land / Communal Land

Farming

Total Area in Production (ha):

Intercropping – what crops?

Rotational farming – what crops?

<i>Cassava:</i>	Area -	Years grown –
<i>Cashew:</i>	Area -	Years grown –
<i>Rice:</i>	Area -	Years grown –
<i>Rubber:</i>	Area -	Years grown –
<i>Pepper:</i>	Area -	Years grown –
<i>Vegetables</i>	Area -	Years grown –

Additional crop notes:

Liquid Resin

Own trees? _____ trees / Previously _____ trees

Collect only?

Additional Liquid Resin notes:

Natural Resources

Which resources do you collect purposefully?

Frequency 4 years ago:

Frequency now:

Which resources do you collect opportunistically?

Frequency 4 years ago:

Frequency now:

Additional Natural Resource notes:

Observations:

Additional Notes:

Goals Interviews

Interview key informants who present varying viewpoints within the village.

1. Bring the focus on other villagers

What are people in your village like? What are the wealthier or poorer people like? How do people support themselves?

2. Formulating Goals

What goals do villagers have for themselves, their families and their friends? Why do they have these goals?

[Have a discussion about this to pick out nuances which will inform indicator choice]

Is farmland important for villagers? Why/why not? What goals associated with farmland are important?

Are natural resources important for villagers? Why/why not? What goals associated with natural resources are important?

3. Ranking Goals

Please rank the above goals in order of importance for villagers. You can give goals equal ranking if you feel they are of the same importance. Why have you chosen this order?

- 1.
- 2.
- 3.
- 4.
- 5.

4. Changes in indicators since [reference point for 2012]

Farmland goal:

% of people without land – increase/decrease/same/varied. Why?

Average area of land owned/HH – increase/decrease/same/varied. Why?

Amount of rice grown/ha - increase/decrease/same/varied. Why?

Amount of cassava grown/ha - increase/decrease/same/varied. Why?

Amount of cashew grown/ha - increase/decrease/same/varied. Why?

Price cassava/kg - increase/decrease/same/varied. Why?

Price cashew/kg - increase/decrease/same/varied. Why?

New farmland indicators based on above discussion:

Has indigenous communal titling affected any of the above indicators?

Have any other NGO activities affected any of the above indicators?

Natural resources goal:

Number of resin trees owned – increase/decrease/same/varied. Why?

Number of wild meat meals per week/HH – increase/decrease/same/varied Why?

Harvest levels of other NTFPs – increase/decrease/same/varied. Why?

New natural resources indicators based on above discussion:

Has patrolling in the village affected any of the above indicators?

Have any other NGO activities affected any of the above indicators?

Other goals

List other villager goals here and discuss changes in goal indicators (created from earlier discussions about relevancy of goals). Ask if any NGO activities have affected these indicators.

WCS Focus Group Protocol

Objectives

- Understand progress of REDD+ project activities
- Identify REDD+ project outcomes and outcome indicators
- Rank outcomes in order of importance for the REDD+ project
- Understand changes in REDD+ project outcome indicators

Target audience: ICT team and Ecotourism Teams

Duration: 3-3.5 hours

Roles: CW to lead and facilitate discussion. Research assistant (RA) to help with translation if needed.

Layout: Seima Meeting Room, team gathered round table, RA and CW using whiteboard.

Agenda

1. Introduction to the day (15 mins)
2. Discussion on REDD+ project activities (25 mins)
3. Identification of social REDD+ project outcomes (30 mins)
4. Ranking outcomes (15 mins)
5. Identification of indicators for outcomes (40 mins)
6. Identification of trends in indicators (30 mins)
7. Thank you and close (5 mins)

Have BREAKS as appropriate.

Materials

Notepad, flip chart paper, board pens, coloured card, pens, masking tape, Dictaphone, camera.

1. Introduction to the day (15 mins)

- Introduce ourselves
- Introduce the research and ensure everyone is clear on what the REDD+ project is
- Explain agenda for the day
- Read participant info sheet and gain consent
- Any questions?
- Hear everyone's name and job title and their roles and responsibilities for community work.

Materials required: participant information sheets, informed consent forms.

2. Discussion on REDD+ project activities (25 mins)

Purpose: To understand which REDD+ project activities have been implemented since 2012.

How:

- Ask the group what REDD+ project/ community activities have been implemented **since the reference point in time**. Brainstorm activities as another mind map, which will be pinned up around the room for use in further exercises.
- Qualitative questioning to find out what progress has been made on these activities (how long have they been implemented for? What does each activity involve?)

[If not touched upon] enquire about the progress of the following project activities (have they been implemented? How? To what extent?)

1. Support alternative livelihoods which reduce deforestation

- Establish sustainable timber harvests **in buffer zone** (how?)
 - Support agricultural extension activities (which?)
 - Develop NTFP-based livelihood projects (how?)

 - Establish community-based ecotourism (what kind of ecotourism)
 - Provide infrastructure support linked to conservation activities (what has been built?)
 - Develop and manage a system to share carbon benefits (what is this?)
 - Improve literacy and numeracy (how? Teaching? How is this relevant to the project?)
2. Key legal and planning documents for SPF and surrounding landscape approved and implemented
 - **Support for SPF maintained in government and public**
 - Management plan (zonation, regulations) implemented
 - Mondulkiri Provincial Corridors strategy (links with other forests) implemented
 - **Partnerships with private sector (reducing impacts by companies) developed**
 - International cross-border dialogue
 - Adaptive management system (reg. public reviews and workplans)

 3. Reduce forest and wildlife crime with direct law enforcement
 - Enforce wildlife, forest and PA laws and sub-decree through **patrols**
 - *Establish and implement law enforcement monitoring network*
 - *Support: Ensure sufficient patrol buildings, equipment, staffing, patrol personnel capacity*
 - *Support: Liase with Provincial, National and other authorities*
 - Establish **Community based patrolling/monitoring system**

 4. Sustainable land and resource use by core zone communities
 - Land use agreements with communities
 - Legally register communities and users
 - Indigenous land titling
 - Demarcation of forest estate; reforestation of recent clearance
 - *Support: Extension and communication activities*
 - *Support: Liase with Commune Council and other agencies*
 - *Support: Engage with civil society organisations operating in the Project area*

3. Identification of social REDD+ project outcomes (30 mins)

Purpose: To identify up to 5 social outcomes for the REDD+ project

Definitions: Outcome – a short to mid-term change experienced by local stakeholders as a result of a project. I.e. **mid-term changes experienced by the villagers in Seima as a result of the REDD+ project.**

How: Ask the group to come up with outcomes for the REDD+ project for villagers, which are somewhere between immediate results of project (e.g. villager earns money from community patrols) and long term goals (e.g. villager has improved livelihood).

- The RA and leader will explain what an outcome is and give some examples.
- These outcomes should not be too short term and specific, but also not too long-term and broad. Explain that we will first brainstorm some ideas, and then spend some time rephrasing/reorganising them. It will be explained that no ideas are wrong, but for this research we want their ideas to be phrased in a very specific way.
- We will help brainstorm the outcomes by breaking ideas which are long term goals down (e.g. if improving livelihoods is suggested: what livelihoods does the project aim to improve? What are the signs that these livelihoods have improved?) or thinking bigger on short term goals (e.g. if people knowing how much land they own is suggested: how does knowing how much land help improve their livelihoods?)

- The responses will all be written down as a mind-map on the whiteboard/flipchart paper. They will then be rephrased/grouped/reorganised to be collectively comprehensive but mutually exclusive, and not too numerous.
- The team will be asked if they think these outcomes are different to or have changed from those established at the start of the REDD+ project.

Topics to prompt if not suggested (check with team if relevant/not to the REDD+ project and why)

- Sufficient farmland to support the livelihoods of current residents
- Increase security and productivity of natural resources to support local livelihoods
- The team will then be asked to suggest mid-term changes which villagers have experienced as a result of the project which were unexpected. These can be both positive and negative. Again these may be rephrased/reorganised so that they are at the right level.
- Responses will be questioned as to why the team think the REDD+ project aims to achieve these goals and the finalised outcomes will be written down on blue cue-cards, which will be pinned up in a horizontal line on the wall.

Materials: Whiteboard pens, Pens, flipchart paper, masking tape, blue cue-cards.

4. Ranking outcomes (15mins)

Purpose: To establish which social outcomes are the most/least important for the REDD+ project.

How:

Outcomes will first be ranked (horizontally) in order of importance for the REDD+ project through pairwise comparisons and physical repositioning.

- Participants will be asked to rank outcomes and indicators according to how important they are for the REDD+ project.
- Everyone will be asked to take part in blind voting (eyes closed) to give an outcome a higher, lower or equal rank. The highest number of votes determine the action.
- The final order of outcomes, will be qualitatively questioned (why is x outcome more important than y outcome?).

Materials: outcome (blue) cue-cards, masking tape.

5. Identifying indicators for outcomes (40 mins)

Purpose: to come up with 3/4 indicators for each outcome.

Definitions: Outcome indicator – indicates if an outcome has been achieved. An indicator indicates if mid-term change has occurred, but it is not proof.

It should be **Specific | Measurable | Achievable | Repeatable | Time-bound. There can be multiple indicators for each outcome.**

How:

Ask the group to break down each outcome into a specific change which you can measure, and which means the same thing to different people.

- As each outcome is reintroduced, the RA and leader will refer to each cue-card.
- The indicators will brainstormed as a mindmap on flip chart paper or on the whiteboard and then the finalised terms written on pink cue cards and pinned up underneath each outcome.
- Again, we will explain to the group that this will be a discussion where we first come up with ideas and then spend time rephrasing and organising the ideas. It will explained that no ideas are wrong, but for this research we want their ideas to be phrased in a very specific way. The key characteristics of an indicator (SMART) will be pinned up as a reminder of what we are aiming for.

- We will give an example: security of natural resources *could* be broken down into: number of fish meals eaten per week. This is specific, can be measured, means the same to different people and is within a timeframe.
- We will help brainstorm the indicators by breaking each outcome down e.g. what does security of natural resources mean? Which natural resources are important for people? (e.g. resin collection) How do you know if they are secure? (e.g. still owning resin trees).
- All indicators will be questioned as to why the team think they will be relevant to the REDD+ project social goals.

Prompt if not mentioned (check if relevant/not and why)

- Sufficient farmland to support the livelihoods of current residents
 - land ownership measures (% landless, ave holdings);
 - rice sufficiency/crop sales
- Increase security and productivity of natural resources to support local livelihoods
 - total resin tree ownership
 - number of meat meals per week/HH
 - reported harvest levels of other forest products and fish

Materials: whiteboard pens, flipchart paper, pink cue cards, pens, pencils, masking tape.

6. Identification of trends in indicators (30mins)

How:

Go through each indicator (indicating the cue-card on the wall) and ask if it increased/decreased/stayed the same/varied **since ~2012/reference point in time** and why.

- [If reassurance is required] Tell the group that we realise that no project runs perfectly and so the progress towards outcomes may not be all be positive. We want to know, at this early stage of the REDD+ project, which indicators have improved and which have got worse or not changed.

Materials required: indicator cue-cards, pens, Dictaphone.

7. Thank you and close (5 minutes)

“That is the end of our discussion. Thank you for being so engaged- your thoughts have been really useful. Does anyone have any questions before we depart?”

Livelihoods Interviews

General

Village:

Interview no. :

1. Background

1. What is the village like?

How many people live in the village (HH, no. people)?

What proportion are Bunong/Khmer?

What big changes have there been in the village recently (e.g. new road, motos introduced, school, traders coming)

2. Ranked Livelihoods + purpose. Why this order?

Ranked subsistence + why this order?

Ranked Income + why this order?

3. Different in the dry season compared to wet season? Why?

4. How do people spend the money they make?

5. Ranked largest inputs + why this order?

6. Ranked largest risk of losing money + why this order?

**7. Which groups of people undertake these different livelihood strategies?
Which livelihoods are typically undertaken together?**

8. What other options are available to villagers if they could not farm crops/livestock or harvest resources from the forest?

2. Changes since 2012

1. Have the ways people support themselves in the village changed since [reference point for 2012]? How + why?

3. Explore farming

1. How has the percentage of people in your village growing rice/cassava/cashew/rubber/pepper/vegetables/fruit/livestock (specify) changed since [reference point for 2012]?

Increase - Decrease - Stay Same - Variable

Why?

2. How secure do you think growing the different crops are on a scale of:

Not at all - not very - okay - secure - very secure

Why?

Threats/problems with growing each crop

3. Additional Crop/Livestock notes

4. Explore collection of resources

1. How has the number of people in your village collecting liquid resin changed since [reference point for 2012]?

Increase - Decrease - Stay same - Variable

Why?

2. Do people collect: fish/solid resin/rattan/bamboo/honey/medicinal plants/vine/mushrooms/wild fruit/wild vegetables/timber/animal (specify)/other?

Purpose?

3. How has the percentage of people in your village collecting fish/solid resin/rattan/bamboo/honey/medicinal plants/vine/mushrooms/wild fruit/wild vegetables/timber/animal (specify) changed since [reference point for 2012]?

Increase - Decrease - Stay same - Variable

Why?

4. How secure do you think collecting liquid resin/fish/solid resin/rattan/bamboo/honey/medicinal plants/vine/mushrooms/wild fruit/wild vegetables/timber/animal (specify) are on a scale of:

Not at all - not very - okay - secure - very secure

Why?

5. Threats/problems collecting resources from the forest

6. Additional forest resource collection notes

5. Changes in Threats (if not already covered)

1. Has the temperature and rainfall varied in the last few years around the village?

2. Has variation in temperature or rainfall affected crop yields and harvesting of natural resources? (e.g. timings, amount harvested, feasibility, market price, security)

3. Has the number of people living in the village changed since [reference point for 2012]?

**Increased - Decreased - Stayed the Same
Why?**

4. How has an increased or decreased population affected villager livelihoods?

**5. Do commercial agricultural/logging companies operate around the village? Y/N
If yes, do they affect the livelihoods of people in the village?**

6. What kind of issues do people talk to the village chief about?

7. How often are issues resolved upon talking to the chief?

**8. What proportion/number of people attend village meetings in the dry season and wet season?
Why do they attend?
Why don't they attend?**

6. NGO/REDD+ project activities

1. What NGOs do community work in the village?

What activities do they undertake?

How do these affect people's livelihoods? Positive or negative?

2. What NGOs do conservation work in the village?

What activities do they undertake?

How do these affect people's livelihoods? Positive or negative?

3. What do you know about indigenous communal land titling? Has it taken place in your village or other villages? What positive and negative impacts does it have?

**4. Does the village have a. any community patrolling and b. patrols by local authorities?
Is this more or less than in the last few years?
Do you think this is good or bad? Why?**

5. Has the quality of education (literacy and numeracy) changed in the last few years? Why?

**6. What are the similarities and differences between villages in Seima and villages outside of the forest?
(problems, livelihoods)**

Additional notes

1. Changes in household resin collection

1. Why do/did you collect liquid resin?

2. Does/did your household own any resin trees now/few years ago?

How has the number of resin trees you own changed since [reference point for 2012]?

Increase - Decrease - No change

Why?

3. Do you think you will gain or lose resin trees in the future?

Why?

4. How often do you collect resin from the forest in the dry season?

In the wet season?

Has this changed since [reference point for 2012]?

Dry season: More - Less - Same – Varied

Wet season: More – Less – Same - Varied

Why?

5. Has the amount of resin you collect from each trip changed since [reference point for 2012]?

More - Less - Same - Varied

Why?

2. Changes in village resin collection

1. Which groups of people collect resin in your village?

More likely to be:

Bunong/Khmer/Both

Younger/Older/Both

Lived in village long time/short time/not matter

Grow cash crops/not matter

Why?

2. Has the percentage of people in your village who collect resin changed since [reference point for 2012]?

Increase - Decrease – Same

Why?

3. Has the frequency which they go to the forest changed?

Increase - Decrease - Same

Why?

4. How has the amount of resin people collect on each trip changed?

Increase - Decrease - Same

Why?

3. Security of resin collection

1. How secure do you feel about resin collection as a way of making a living?

Not at all - Not very - Okay - Secure - Very secure

Why?

2.

Do other people collect resin from your trees without your permission?

Do people clear your trees for agriculture? Which groups?

Do people cut your trees down for timber? Which groups?

What other threats/problems are there for collecting resin in the village?

3. Have these threats changed since [reference point for 2012]?

Increase - Decrease - Same – Variable

Increase - Decrease - Same – Variable

Increase - Decrease - Same – Variable

Increase - Decrease - Same - Variable

Why?

5. What price (riel/30 litre) do you sell liquid resin for in the dry season?
in the wet season?
Is this higher or lower than a [reference point for 2012]?

6. How do you make up lost income if you collect less liquid resin?

4. Aspirations

1. How do you think your children will make a living when they are adults?

5. NGO/REDD+ project activities

1. What NGOs do community work in the village?

What activities do they undertake?

How do these affect people's livelihoods? Positive or negative?

2. What NGOs do conservation work in the village?

What activities do they undertake?

How do these affect people's livelihoods? Positive or negative?

3. What do you know about indigenous communal land titling? Has it taken place in your village or other villages? What positive and negative impacts does it have?

4. Does the village have a. any community patrolling and b. patrols by local authorities?
Is this more or less than in the last few years?

Do you think this is good or bad? Why?

5. Has the quality of education (literacy and numeracy) changed since [reference point for 2012]? Why?

6. What are the similarities and differences between villages in Seima and villages outside of the forest? (problems, livelihoods)

Additional notes

1. Changes in household collection of natural resources since 2012

**1. What natural resources does your household collect from the forest? Fish/solid resin/rattan/bamboo/honey/medicinal plants/vines/mushrooms/wild fruit and vegetables/other
What are they used for?**

2. Which resources do you make special trips to the forest?

**3. How often do you collect these resources in the dry season? In the wet season?
Is this frequency: More - Less - Same - Varied since [reference point for 2012]
Why?**

**4. Has the distance you travel to find these resources changed since [reference point for 2012]?
More - Less - Same - Varied over time
Why?**

**5. Has the amount of resource you collect on each trip changed since [reference point for 2012]?
More - Less - Same - Varied over time
Why?**

6. How do you harvest the resources? Have these methods changed since [reference point for 2012]?

2. Changes in village natural resource use

**1. Which groups of people collect these resources from the forest?
More likely to be: men/women/both?
Bunong/Khmer/both?
Younger/Older?
Lived in the village long/short time?
Why?**

**2. Has the percentage of people who collect resources from the forest (named) changed since [reference point for 2012]?
Increase - Decrease - Same - Variable
Why?**

3. Has the amount of natural resources (named) they collect from the forest changed?

Increase - Decrease - Same - Variable

Why?

3. Security of natural resource collection

1. How secure do you feel about collecting the named resources from the forest?

Not at all - not very - ok - secure - very secure

Why?

2. Do you think you will collect more - less- the same amount of these resources in the future?

Why?

3. Which resources take the longest to grow back to harvestable levels?

4. Do people clear the forest for agriculture? Which groups?

Do people cut trees down for timber? Which groups?

5. What other threats/problems are there for collecting resources from the forest?

Have these threats changed since [reference point for 2012]?

Increase - Decrease - Same - Variable

Why?

6. If you collect fewer edible resources from the forest how will you get the nutrients/protein you and your family need?

7. If you collect fewer medicinal plants, how do you get the medicine you and your family need?

8. If you collect fewer sellable resources, how do you make this lost income?

9. Do you sell resources to the same trader as you did in 2012 [reference point]?

10. Has the price for sellable resources changed since [reference point for 2012]?

Higher - Lower - Stayed the same - Variable

Why?

4. Clean water availability

1. From where do you collect water from your household? Has this changed since [reference point for 2012]? Why?

2. Has the quality of water in your village changed since [reference point for 2012]? How? Why?

5. NGO/REDD+ project activities

1. What NGOs do community work in the village?

What activities do they undertake?

How do these affect people's livelihoods? Positive or negative?

2. What NGOs do conservation work in the village?

What activities do they undertake?

How do these affect people's livelihoods? Positive or negative?

3. What do you know about indigenous communal land titling? Has it taken place in your village or other villages? What positive and negative impacts does it have?

4. Does the village have a. any community patrolling and b. patrols by local authorities?

Is this more or less than in the last few years?

Do you think this is good or bad? Why?

5. Has the quality of education (literacy and numeracy) changed since [reference point for 2012]? Why?

6. What are the similarities and differences between villages in Seima and villages outside of the forest? (problems, livelihoods)

Additional notes

1. Changes in household land ownership/tenure

1. Did you own/rent land a few years ago?

If no, why did this change?

2. Has the area of land you own/rent changed since [reference point for 2012] for a. building land and b. farming land?

More - less - same area

Why?

3. What do you use your land for?

2. Changes in village land ownership/tenure

1. Which groups of people own land in the village?

Which groups of people rent land in the village?

Are they more likely to be:

Bunong/Khmer/both

Lived in the village a long/short time

Why?

2. Has the percentage of people in your village who a. own land, b. rent land, c. area of land owned or rented changed since [reference point for 2012]?

Increase - Decrease - Stayed the same

Why?

3. What do people who a. own the land and b. rent the land mainly use the land for?

Why?

3. Security of land

1. How secure do you feel about the land which you own/rent?

Not at all - Not very - Ok - Secure - Very Secure

Why?

2. What causes a. people to lose land, b. peoples' land to become lower quality?

3. Does land grabbing take place in your village?

Do land concessions operate around your village?

4. What other threats/problems are there for owning/renting land in the village?

Have these threats changed since [reference point for 2012]?

Increase - Decrease - Same - Variable

Why?

5. [If ICT has been completed in the village] How has communal titling affected a. how secure you feel about the land, b. how much you can expand your land?

Has it been positive or negative?

6. What makes some land more expensive than other land for a. building land and b. farming land?

7. Have land prices changed in and around your village since [reference point for 2012]?

Increased - Decreased - Stayed the same

Why?

Has this impacted people in your village?

1. Do you think the amount of land you own will change in the future? How? Why?

5. NGO/REDD+ project activities

1. What NGOs do community work in the village?

What activities do they undertake?

How do these affect people's livelihoods? Positive or negative?

2. What NGOs do conservation work in the village?

What activities do they undertake?

How do these affect people's livelihoods? Positive or negative?

3. Does the village have a. any community patrolling and b. patrols by local authorities?

Is this more or less than in the last few years?

Do you think this is good or bad? Why?

4. Has the quality of education (literacy and numeracy) changed since [reference point for 2012]? Why?

**5. What are the similarities and differences between villages in Seima and villages outside of the forest?
(problems, livelihoods)**

Additional notes

Land Use

Village:

Interview no. :

1. Explore farming and changes

1. Which crops do you grow?

Rice (paddy)/rice (upland)/Cassava/Cashew/Rubber/Pepper/Vegetables (specify)/Fruit (Specify)/Livestock (specify)/Other

2. What are they used for?

Which are the most important for subsistence?

Which are the most important for income?

3. For each farming practice, please describe: the inputs required (mechanisation, chemicals), processes to cultivate/rear crops/livestock, no. pp/ha in labour, outputs.

4. Has the amount of each crop that you grow/the number of animals that you farm changed since [reference point for 2012]?

Increase - Decrease - Same - Variable

Why?

2. Changes in village land use

1. Which groups of people grow these crops/livestock?

More likely to be:

Bunong/Khmer/both?

Younger/Older?

Lived in the village long/short time?

Why?

2. Has the percentage of people who grow the different crops/farm animals (named) changed since [reference point for 2012]?

Increase - Decrease - Same - Variable

Why?

3. Has the percentage of people who practice rotational rice farming in the village changed since [reference point for 2012]?

Increase - Decrease - Same - Variable

Why?

3. Security of growing crops

1. How secure do you feel about cultivating the different crops/livestock?

Not at all - not very - okay - secure - very secure

Why?

2. Do you think you will grow more- less- the same amount of these resources in the future?

Why?

3. Which are the best crops to grow?

Why?

4. Which crops provide the biggest return on initial investment?

Why?

5. For which crops is there a higher risk of losing money?

6. Have changes in a. temperature and b. rainfall affected farming practices?

7. What causes loss of crops?

8. What other problems/threats are there to growing crops/rearing livestock?

Have these threats changed since [reference point for 2012]?

Increase - Decrease - Same - Variable

Why?

9. What price do you sell crops/livestock?

Is this higher or lower than [reference point for 2012]? Why?

Does the same or a different trader buy it? Where do they sell it?

10. How do you cover loss of food and income if crops yield is lower or livestock die?

4. NGO/REDD+ project activities

1. What NGOs do community work in the village?

What activities do they undertake?

How do these affect people's livelihoods? Positive or negative?

2. What NGOs do conservation work in the village?

What activities do they undertake?

How do these affect people's livelihoods? Positive or negative?

3. What do you know about indigenous communal land titling? Has it taken place in your village or other villages? What positive and negative impacts does it have?

4. Does the village have a. any community patrolling and b. patrols by local authorities?

Is this more or less than in the last few years?

Do you think this is good or bad? Why?

5. Has the quality of education (literacy and numeracy) changed since [reference point for 2012]? Why?

**6. What are the similarities and differences between villages in Seima and villages outside of the forest?
(problems, livelihoods)**

Additional notes