Making Ecosystems Count in the Sustainable Development Goals:
Stakeholder Consultation Report
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1. Introduction

In 2016, the Sustainable Development Goals (SDG) will come into force and UN member states will commit to achieving the social, economic and environmental SDG targets. This report synthesizes findings from 28 interviews with stakeholders in Burkina Faso, Ghana and the United Republic of Tanzania, to assess needs, opportunities and challenges in the use of ecosystem service (ES) indicators in national-level planning to achieve the SDGs.

The overarching objective of this stakeholder consultation was to identify research priorities for the Science for Nature and People ‘Making Ecosystems Count in the SDGs’ project which runs from July 2014 to July 2015. This project seeks to identify which and in what contexts ES indicators can be used to inform sustainable development planning, and to facilitate the uptake of SDG-relevant ES indicators through extensions to existing ES assessment and valuation tools. Our intention is for these combined extensions to provide a toolkit that enables users to test how different ecosystem management options - resulting from varied development policy and investment choices - may contribute to or detract from progress towards achieving SDG targets as mediated by ecosystem services. The tool will trace the effect of a policy or investment decision from identification of several implementation scenarios (i.e. feasible options for intervention type, location, design and management, but also how the decision is affected by various external factors such as population growth) on ecosystem service supply, and the impact of these changes on indicators that monitor progress towards SDG targets. We refer to this as the Modelling Ecosystem Services for Human well-being (MESH) toolkit.

Context

This project stems from a recognition that: (i) we currently lack practical tools to disentangle the trade-offs and dependencies between ecosystem and socio-economic change, and (ii) these tools would facilitate identification of land-use management options that maximise progress towards conservation and social objectives as a cohesive goal-set. For example, a review by the Commonwealth on progress towards achieving the Millennium Development Goals (MDGs) in Tanzania points to this gap, with civil society organisations (CSOs) proposing that for future development frameworks, “more attention should be given to key environment-related areas such as water, sanitation and health, food security, and sustainable agriculture and its connection to sound environmental management”\(^6\). In the report, CSOs also emphasise that there is a need for a future development framework that supports and enables localisation of goals and measurements, where indicators assess “quality as well as quantity” and include “non-income measures of poverty and wealth”\(^7\). With the SDGs on the horizon, we aim to provide a practical tool that will facilitate the use of existing knowledge on ecosystem-society interactions in decisions about how to achieve sustainable development.

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\(^7\) p.7. ibid
Six months of preparation preceded the stakeholder consultation, focused on scoping the feasibility of the tool design from a scientific perspective and developing a strategy for assessing its utility from a practitioner perspective. During the first four months of the project, the team focused on mapping the links between ES and each SDG target to identify potential ES-based indicators for sustainable development decision-making. A workshop was held on 6-10 October 2014 bringing together researchers from the ecological and socio-economic sectors. Participants reviewed the Open Working Group proposed SDGs and underlying targets to identify where ecosystem services could be directly linked to progress on attainment of specific goals. Participants were asked to rank the links between the identified ecosystem services and stated SDG goal on a scale of low, med, high to identify priority goals. This rapid assessment led to the group prioritization of four SDGs: food security (SDG2), health (SDG3), water (SDG6) and energy/climate (SDG 7,13) in addition goals on ecosystem conservation (SDG 14,15). Following the October workshop, for each prioritized SDG the major themes were extracted from the targets and we identified the suite of ecosystem services that may impact the target. The use of target themes was deemed appropriate because the specific wording of targets below each goal were expected to change over the course of the UN negotiations, but not the aim of the SDG itself. In many cases multiple ecosystem services were linked to a single target (e.g. pollination and pest control for target on increasing food production).

For each of the ES identified as relevant to each SDG target theme, we conducted an extensive review of literature to identify relevant datasets, equations and models that had been developed and linked a change in land use to a change in ecosystem service supply to a measure of human well-being associated with the target theme. The SDG indicators proposed by the Sustainable Development Solutions Network (SDSN) were used as a guide for the types of metrics that will be adopted as part of the SDG monitoring framework in 2016. This work produced a series of outlined pathways from changes in land use to changes in ecosystem service supply and effects on SDG targets, and potential indicators for monitoring these ES-SDG target linkages. Some of the proposed pathways were removed because there was insufficient scientific evidence to robustly quantify the linkages. The result of this work was a list of 33 loosely defined ES-indicators for which a spatially explicit model could potentially be developed based on existing scientific evidence (see Annex 1 for a list of the 33 indicators). These 33 potential indicators were used as a basis for discussions with stakeholders during the consultation.

**Report structure**

This consultation report is structured in five sections. Following the introduction, Section 2 sets out the consultation objectives, scope and the approach taken to interviewing stakeholders for the project. Section 3 summaries the key findings from the consultation for each country considered. Section 4 discusses what these results mean for this SNAP project and more generally the potential value of ES indicators for sustainable development planning. Finally, section 5 sets out the action plan for the SNAP project over the next few months and makes recommendations for future research priorities to facilitate the use of ES indicators in sustainable development planning.
2. Consultation approach

We were keen to engage stakeholders early in the project to gauge stakeholder interest in and eventual utility of the MESH toolkit and its outputs, to inform the tool design. The specific objectives of the consultation were:

- **Objective 1**: Understand current conception of the SDGs and their potential relevance as a framework for making decisions about land use change;
- **Objective 2**: Identify priority objectives at a national-level for development and conservation, and tensions between these objectives;
- **Objective 3**: Determine which indicators are already in use or could be useful for planning and monitoring to achieve multi-sectoral development and conservation targets;
- **Objective 4**: Gauge stakeholder interest in and potential utility of the MESH tool.

To meet our objectives, we conducted semi-structured interviews with policy-makers, donors, private sector institutes, civil society organisations (CSOs) and researchers working at a national-level in the agriculture, water, health and environment sectors in Burkina Faso, Ghana and Tanzania.

2.1. Identifying and engaging stakeholders

We carried out an initial stakeholder mapping exercise to identify potential institutions to engage in each country. We focused on organisations in Burkina Faso, Ghana, and Tanzania involved in:

- Setting or shaping development policies and investments that substantially alter ecosystems, notably major infrastructure projects; and
- With a strong interest in or accountability for meeting national-level commitments on those SDGs prioritised for research by this project (SDGs 2 - food security, 3 - health, 6 - water, 15 - terrestrial ecosystems).

First, we collated a list of organisations and individuals that participants of the SNAP October 2014 workshop (such as Vital Signs, CIAT, IFPRI) suggested should be approached, based on their experience working in the Nile and Volta basins. Next, we conducted an internet search to identify other government institutions, international organisations, CSOs, development donors, and large-scale infrastructure investors active in each country, focusing on agriculture, health, energy and water sectors. Through this approach, more than 250 individual stakeholders were identified across the three countries. To reduce this list to a manageable number to interview, we classified stakeholders as “relevant”, “probably relevant” and “probably not relevant” according to how closely aligned we thought the institution’s activities and remit were to our SNAP project. From the list of relevant or probably relevant stakeholders, we sought recommendations on which individuals to approach, and their contact details, from the Water, Land and Ecosystem (WLE) regional points of contact and SNAP working group participants, and identified individuals from institutional organograms where these were available online. Some stakeholders had to be excluded because we were unable to obtain contact details.
We approached each of the 74 individuals (spanning 57 institutions) on the resulting list via email or telephone between 5 January and 6 February to request face-to-face meetings at their place of work during the period 9-18 February 2015. We included a project briefing note in French (Burkina Faso) or in English (Ghana, Tanzania) in the meeting request to provide more information about the project objectives (see Annex 2). Where face-to-face meetings were not possible, we requested interviews via telephone (one instance only).

The positive response rate to interview requests across the 57 institutions contacted during the consultation ranged from 39% in Tanzania to 65% in Burkina Faso and 71% in Ghana. In total, we conducted 28 interviews during the period 8-18 February 2015, involving 53 individual stakeholders (excluding individuals attending one multi-stakeholder workshop) and 31 institutions. These comprised 8 interviews and participation in one multi-stakeholder workshop in Tanzania, 11 interviews in Ghana, and 9 interviews in Burkina Faso. Figure 1 and Figure 2 show the breakdown of institutions interviewed by sector and institutional type respectively. Institutions were classified by type and sector based on our interpretation of institution positioning within the selected categories. Annex 3 provides a list of institutions who participated in the consultation and sector / type classification used for the purposes of this report.

Figure 1: Institutions interviewed by sector in each country.
2.2. Interview methodology

The interview team comprised the core members of the SNAP MEC project: Fabrice DeClerck, Justin Johnson, Sarah Jones and Sylvia Wood. All four interviewers conducted the first day of interviews in Tanzania together, to ensure we used a consistent interview approach and language in subsequent interviews where we mainly worked in pairs. Interviews lasted about 1hr in duration.

One member of the team opened each interview by introducing the team members, project objectives, how it fits within broader scope of CGIAR work in the region, and the purpose, structure, and expected outcomes from the meeting. This was followed by inviting the participant to introduce themselves, their role within their organisation, and any other expectations they may have for the meeting. After the introduction, interview participants were asked if they were comfortable with the meeting being recorded for note-taking purposes, and the recorder was used only after stakeholders had given permission.

We used a list of 10 common questions to guide the discussion in each interview, as follows:

1. What are the priorities in terms of development outcomes within your organisation and more broadly within your sector of work?
2. What are the main types of projects and activities you are engaged in to help achieve these development outcomes?
3. How is agriculture and the environment important, or not, in these projects?
4. Do you have specific interactions with the ministries of Agriculture, Environment, Water or Health? Please describe.

5. Are there specific organisations you commonly interact with in planning or implementing development projects, such as the Ministry of Finance?

6. What are some of the opportunities, or challenges, of working on agriculture, environment, and human health (or more generally of working on sustainable development in your sector)?

7. Are there any information or data that are important for helping to overcome these challenges? If yes, what kind of information is useful to evaluate, and negotiate trade-offs?

8. Is this the same information that helps to identify and keep track of changes in development outcomes as a result of these projects and activities? i.e. what types of indicators are used to assess progress towards goals and targets?

9. What information or data is missing/lacking that could help you make or track these decisions better, or to work better with sister organizations/agencies? [Present indicator list if appropriate]
   a. Would your organisation be interested in using this information or data? What sort of projects would you use these for?
   b. What indicator format do you find most helpful for decision-making? E.g. indicators that show decision outcomes in economic / human livelihood terms, or compared to a specified development target that you or your country are aiming to meet. [Discuss SDGs here briefly].

10. [If not already addressed] In what ways does your organisation consider the impact on the environment, and the impact of environmental change on development outcomes, in development projects?
    a. Are these impacts assessed and, if so, by whom? What tools and indicators are used to measure these impacts?
    b. [If there is time to present our tentative indicator list] Which of the indicators in our draft indicator list would you consider useful and why?

The questions were designed to help meet the four consultation objectives. As such, questions 1 and 2 were intended mainly to respond to Objective 1 (relevance of SDGs); questions 3 to 6 to Objective 2 (conservation-development tensions); questions 7 to 9 Objective 3 (existing indicators); and question 10, and responses to the other questions, to Objective 4 (potential for MESH tool). The questions were intentionally open-ended to encourage stakeholders to share their full opinion.

Throughout the interviews, we tried to avoid the use of jargon such as “ecosystem services”, “modelling” and “scenario analysis”. Time and interest permitting, we asked the participants to indicate which indicators on our tentative list of 33 (see Annex 1) would be of interest to them. This enabled us to collect highly specific information on the types of indicators stakeholders considered useful from a subset of participants. In all other interviews, we used the responses to questions 6-10 to identify when one of the indicators on our list was mentioned as already in use or potentially useful to a stakeholder.
At the end of the interview, we invited participants to ask questions to us and indicate if they would be interested in staying informed about the project activities and wider CGIAR work in the region.

2.3. Collating and analysing responses

Each interviewer took notes during the interviews. These notes were collated into one document and organised by the 10 common questions used in each interview, then cross-reviewed by the interview team. Where there were ambiguities or conflicting understanding among the team, interview recordings were used to confirm and clarify stakeholder responses.

We did not attempt to transcribe in full and systematically analyse and categorise interview material. This would have enabled quantitative analysis of responses and a more in-depth qualitative assessment, but was not considered feasible in the project time-frames. Instead, we analysed the interview notes to identify common and contrasting themes conveyed by stakeholders within and across the three countries, in relation to our four objectives.
3. Results by country

This section presents our interpretation of the information collected during 28 interviews with representatives from the environment and development sectors primarily working at the national-level in Burkina Faso, Ghana and Tanzania.

3.1. Burkina Faso

The nine interviews in Burkina Faso spanned the agriculture, water, environment and development sectors, and included representatives from two international organisations, three national government bodies, three research institutes, one donor organisation, and one private sector organisation. We were unable to meet any health sector representatives.

*Current conception of the SDGs and their potential relevance as a framework for making decisions about land use change*

Government ministries and donors that we interviewed in Burkina Faso *were aware of the SDG process but framing discussions around current national priorities and established national level targets gained more traction with all participants*. Across all stakeholder groups interviewed, participants stressed that priorities for development are set by government. Despite this, several stakeholders explained that funding to meet these priorities was dependent on donor interests, implying that investors hold much of the decision-making power over what types of activities are undertaken to achieve development goals, and how and where these take place. For example, one participant explained that donor interests in the environmental sector are currently heavily focused on climate change adaptation and mitigation making it difficult to secure funding for projects that are not directly linked to this agenda.

*Priority objectives for development and conservation, and tensions between these objectives, across different stakeholder groups involved in decisions about land use*

*Increasing food security in the face of water scarcity, land degradation and drought* (associated with climatic changes), primarily through increasing agricultural yields and access to irrigation, was a priority development objective for stakeholders in the agricultural sector. Aside from water supply and soil fertility, ecological factors that stakeholders mentioned that need to be managed to secure food supplies included pests such as seed-eating birds causing loss of harvests, and contamination of soil and water from artisanal gold mining. There was a high level of awareness regarding negative environmental impacts of agriculture on the environment, such as pollution of water by pesticides and degradation of riparian habitat; and some discussion of the feedbacks to people, such as drinking water availability and prevalence of waterborne diseases (including malaria) associated with dams, irrigation expansion and insecticide management. There was limited interest in health impacts associated with receiving adequate nutrition, which were viewed as a health sector concern, nor on the idea of managing agriculture to support conservation objectives (and thus increase the flow of ecosystem services to agriculture).
Stakeholders in the water sector highlighted *access to clean drinking water* as a number one priority. Water pollution from agriculture and artisanal mining practices were flagged as a serious problem and one participant explained that Direction Générale des Ressources en Eau are assessing the value of user-pays and polluter-pays principles as one solution, but recognise implementation as a huge challenge due to existing norms for water management and limited funding. Two participants highlighted the link between sanitation (latrine location and use) and clean water and the need for education and investment to improve sanitation practices.

Maintaining adequate water supplies is a major challenge; one participant explained that their records show water levels in reservoirs are falling with several dams having dried up this year. Several participants identified land management (sedimentation control) upstream of dams and rivers as important for maintaining water levels and quality. At least two institutions interviewed were focusing on water-use efficiency in agricultural production as one solution.

Environmental concerns were focused around *water withdrawals and pollution increasing pressure on wetlands and associated ecosystem services* (including water purification), making wetland protection and restoration a key priority. One participant explained there are tensions between deforestation for fuelwood, timber, and agricultural expansion, and loss of forest services, thus requiring coordinated response efforts from agricultural, environmental and energy sectors.

*Land degradation, water scarcity and water pollution* were consistently identified by stakeholders as *major environmental threats* facing Burkina Faso. The *social drivers* that interview participants associated with these threats included *rapid population growth, agricultural expansion and pollution from mining*, although there were mixed opinions on how to deal with these trade-offs. These pressures on land and water were a major cause for concern for stakeholders in all sectors, viewed by some as the *key constraint to increasing agricultural production and root cause of conflicts around resource access and use*. It was also clear that stakeholders perceived maintaining adequate freshwater supplies for multiple user groups as a major cross-sectoral and transboundary challenge. A fundamental issue that emerged from the interviews was the reduced option space for environmental management in food insecure areas where most people live in poverty and meeting short-term needs has to take priority. There was concern for at least two stakeholders that *if you prioritise the environment, it is seen as at the cost of development.*

*Indicators that are already in use, or could be useful, for planning and monitoring to achieve multi-sectoral development and conservation targets*

Most stakeholders mentioned *data scarcity* as a constraint to using indicators for planning and monitoring purposes. This includes a lack of baseline data needed for planning purposes and disaster response, and incomparable baseline data collected across borders with other Volta Basin countries. The types of indicators mentioned as currently in use by national government stakeholders were focused on production or market values, e.g. yield, food consumed versus food produced. There was a strong interest from several stakeholders in having indicators that
could help show or monitor how management in one sector affects another to help assess cross-sector impacts and coordinate interventions, e.g. how water management decisions affect pasturage or human infections with guinea worm, how irrigation expansion affects poverty levels for different stakeholders, how wetland management and condition effects drinking water and irrigated agriculture.

One participant explained their view that there is a pressing need for ecosystem service valuations to convey the (economic) trade-offs of different ecosystem management options; with respect to recommendations for ecosystem conservation, “On essaye de donner une valeur économique parce que le problème, si on ne donne pas la valeur économique, on est demandé toujours combien ça coûte” (“we try to provide an economic value because the problem is that if we do not, we are always asked how much it costs”). Several participants stressed that it was important for indicators to show attribution of projects to livelihood changes to secure funding, e.g. changes to food security, community resilience and vulnerability, and for monitoring purposes, e.g. number of people affected by an intervention. Another participant pointed out that, for indicators to be useful, it is important they are feasible to collect and expressed in a way that is comparable across sectors.

Stakeholder interest in and potential utility of the MESH tool

Organisations involved in project implementation were generally more interested in the MESH tool than organisations in advisory or funding positions. Lack of readily-available baseline data needs to be accommodated into the tool design for it to be usable in Burkina Faso.

3.2. Ghana

We conducted eleven interviews in Ghana across the agriculture, health, water, environment and development sectors. These interviews were attended by representatives from three international organisations, eight national government bodies, and one civil society organisation. In contrast to Burkina Faso, we did not manage to get interviews with any relevant research, private sector or donor organisations.

Current conception of the SDGs and their potential relevance as a framework for making decisions about land use change

Overall, there was a high level of interest from government-sector stakeholders, and some interest from other sectors, in the idea of aligning indicators with SDG targets as a way of demonstrating project value and monitoring progress. Nearly all interview participants were well-informed about, and engaged with, the SDG process; several participants from government and international organisations had shortly returned from meetings specifically focusing on critiquing and negotiating national indicators aligned with the proposed SDGs. Stakeholders were actively pushing for their sector specific issues to be clearly defined and embodied within the SDGs; for example one participant explained they were advocating that forest protection should be encapsulated in more than one SDG, because it is a core and cross-cutting part of many development goals. Getting to the crux of the sustainable development concept, one participant
expressed the view that environmental challenges should be pursued cohesively with
development objectives at global and national levels, and that “climate change is not an
environmental issue, it is a development issue”.

Decisions about land use, while suggested and actioned by ministries, are ultimately agreed by
the National Development Planning Commission in Ghana, and funded through the Ministry of
Finance, meaning these stakeholders hold a high degree of influence during the decision-
making process.

Priority objectives for development and conservation, and tensions between these objectives,
across different stakeholder groups involved in decisions about land use

Securing domestic water supply is the main priority for the water sector according to interview
participants, with irrigation and aquaculture looming as potential threats on water security. The
importance of meeting this objective was echoed by stakeholders we interviewed from the
development sector. Illegal gold mining in the south of Ghana is a major concern to both water
(due to high levels of water use, and surface and groundwater pollution) and agricultural sectors
(causing loss of fertile land). Impacts of domestic water pollution and different used-water

treatment practices are an issue of increasing interest to policymakers in the water sector, to
maintain acceptable water quality. This was contrasted with views from an agriculture sector
participant who was of the opinion that environmental trade-offs from irrigation expansion were
not problematic; “We have only irrigated 11% of potential lands, so the tradeoffs are not yet [an
issue]”. We understood from interview participants that priorities in this sector focus on
improving food security and income generation through increasing yields. Soil erosion and loss
of soil fertility were identified as the major issues for dryland farmers.

National health sector priorities in Ghana, as portrayed through interviews, are wide-ranging but
include: halting the spread of communicable diseases notably malaria, tuberculosis, HIV-AIDS,
and new tropical diseases; reducing health problems related to polluted drinking water, linking to
corns in the water sector discussed above; preventing guinea worm disease, brucellosis,
and child bronchitis caused by smoke from cooking with fuelwood. The latter was also raised by
the environmental sector in relation to demonstrating trade-offs in use of forest services. One
interview participant was of the view that it would be “easy to get buy-in” for a tool that could link
ES change to reduced exposure to emerging tropical diseases or malaria, reduced anaemia,
adequate dietary diversity, or the amount of drinking water meeting minimum quality standards.
This participant was of the opinion that there is not currently enough evidence or data to take
these links between environmental change and health into account.

Environmental stakeholders we interviewed discussed the wide-range of livelihood impacts from
environmental management decisions and the challenge and importance of demonstrating
these impacts. For example, the Environmental Protection Agency (EPA) are campaigning for
improved upstream land management in the Volta river to reduce sedimentation and recover
energy production in the Akosombo dam (production has currently fallen to drastically low
levels), but interview participants conveyed that stronger evidence is needed to convince dam
managers of the investment value of upstream land management. Participants explained that the environment and agricultural sector are working together to control soil erosion and improve soil fertility in degraded parts of northern Ghana, for soil conservation and improved agricultural production. However, one participant from the environment sector spoke of the challenge of showing non-timber and “intangible” services from forest systems, such as control of pests on cocoa farms, and the need for improved agricultural management practices to halt declines in forest services, such as the effect of pesticides on pollinators.

Major issues at the environment-development nexus identified by participants in Ghana were sedimentation control, upstream water withdrawals and hydropower (including how to implement user-pays principle), securing water supply for irrigated agriculture and drinking in drought-prone northern Ghana, mining creating pressures on agricultural land and drinking water quality in southern Ghana, and forest degradation mainly from agricultural practices and expansion.

Funding, such as for data collection and analysis, was listed as a constraint by all sectors and one stakeholder considered competition for funding as a barrier to cross-sector communication.

**Indicators that are already in use, or could be useful, for planning and monitoring to achieve multi-sectoral development and conservation targets**

Several stakeholders showed interest in having a wider-range of indicators (i.e. beyond ecosystem service production values) to understand the effect of ES change on livelihoods and inform cross-sector planning, but expressed concern that there are serious gaps in data, and data that do exist are not well-coordinated across sectors. Stakeholders we interviewed from the water sector were well-aware of the interlinkages between environmental management and water supply and quality, and are monitoring some aspects of these linkages (e.g. water pH). These participants stressed the need to balance trade-offs across ministries when trying to achieve each SDG, as these will undoubtedly exist. They felt that indicators to help weigh-up these trade-offs would be valuable. While the notion of managing ecosystems to support agriculture or health objectives seemed a relatively novel concept to stakeholders we spoke to in these sectors, stakeholders emphasised their interest in access to better information about linkages, such as between land degradation and yields, and surface water management and spread of communicable diseases, to facilitate efforts to secure their objectives.

Environmental sector stakeholders consistently showed high levels of interest in livelihood-based measures of environmental change especially to show the socio-economic value of conservation, e.g. effect of upstream land management and forest loss on hydropower generation, or changes to agricultural yield with and without sustainable land management. Participants in two interviews mentioned that easier access to gender disaggregated indicators would be useful, for example to assess effects on agricultural livelihoods because many women are farmers. A stakeholder from the development sector expressed their interest in having indicators to track deforestation and reforestation, especially in transition belts, and effects of ecosystem change on tourism and water quality. In a similar vein, a health sector stakeholder
perceived impact-oriented indicators as the most valuable, such as child mortality or poverty levels, for project monitoring, negotiating project design, and securing funding. Indicators for effects of land use change on water supply and water quality were valued highly by water and agriculture sectors, mainly in relation to drinking water access and irrigation potential.

**Stakeholder interest in and potential utility of the MESH tool**

Feedback on the MESH tool concept was generally positive and some stakeholders seem to be in a strong position to use the tool, both from a technical perspective and in terms of the types of challenges they face. Valuable advice provide by one stakeholder was that "for uptake of such a tool, we absolutely need a strong evidence base", i.e. proven case studies, and that one way to achieve this is to task the tool validation to local research groups that already inform policy.

The NDPC and Ministry of Finance are central players in land use decisions – as identified by all stakeholder groups – and are therefore well-placed to use information on trade-offs of ES change to strengthen cross-sector decision-making. The NDPC are already engaged with fostering cross-sector communication for improved outcomes, e.g. it encourages discussions between health and agriculture sectors for better irrigation planning. Meanwhile, water is clearly a pivotal issue in Ghana and has transboundary implications, putting the Ghana Water Resource Commission in a strong position to use indicators from the output of the models to manage and balance cross-sectorial water demands. The Environmental Protection Agency expressed a high level of interest in using the MESH tool and is also in a good position to do this given their GIS capacity, established GIS-based monitoring and evaluation system, and role in coordinating land management decisions across the ministries. The Forestry Commission have an established GIS-based data collection system and seem to have a strong need for the type of information that the MESH tool could provide for funding, campaigning and education purposes, so could also be potential next-users of the tool.

One participant reflected that "testimonials have a lot of weight when garnering support and trying to sway policy" and explained the value in having a story attached to any data aimed at shaping policies. Statements like this point to the interest among policymakers in showing they connect with everyday problems, and reinforce the need for ecosystem service assessments to connect to livelihood-level outcomes.

### 3.3. Tanzania

In Tanzania, we conducted eight interviews across the agriculture, health, water, environment and development sectors. These interviews were attended by representatives from two international organisations, three national and one sub-national government bodies, one donor and one civil society organisation. We were unable to secure interviews with relevant research or private sector organisations.

**Current conception of the SDGs and their potential relevance as a framework for making decisions about land use change**
Although few participants were familiar with the existing set of SDGs or the global processes underway for establishing these, stakeholders from all sectors emphasised that development approaches in Tanzania are driven by Tanzania’s national planning policy documents (e.g. The Tanzania Five Year Development Plan 2011/2012 - 2015-2016, and Big Results Now) and that these are deliberately aligned with the Millennium Development Goals. This indicates the potential strength of the SDG framework for land use decisions, provided global development goals continue to be captured in national planning policy.

Priority objectives for development and conservation, and tensions between these objectives, across different stakeholder groups involved in decisions about land use

Major concerns that stakeholders raised at the development-conservation nexus comprised water supply variability and scarcity related to hydropower and agricultural production; maintaining productive land for farming; control of communicable diseases particularly related to agricultural activities; and protection of ecosystems supporting eco-tourism.

The agricultural sector are prioritising large-scale irrigation and production schemes, and several participants explained that this is to increase yields and revenues from preferred varieties and to secure private sector investment in Tanzania. In one interview, participants explained their view that the private sector hold the key to poverty eradication in rural landscapes. They explained that land purchased by agricultural investors can have conditions attached that promote development, such as “to improve infrastructure, value addition through setting up a processing industry… and improved social services”, and this means villagers are “always happy to give away productive land”. However, participants in another interview spoke at length about conflicts arising between private investors, pastoralists, and arable farmers over land-use related to these large-scale agricultural investments, e.g. local losses of the most fertile land to investors, fuelled by the lack of village-level land-use plans and generally weak, informal or communal land tenure rights in rural areas. Activities we learned of that could reduce these conflicts include work by the Ministry of Management of Livestock and Fisheries Development to develop management plans for communal grazing land.

Water scarcity was mentioned in four interviews as a major limiting factor to agricultural production, while access to markets was highlighted in two interviews. There appeared to be significant overlap between wetland zones and areas prioritised by the government for irrigation investment, although only one participant expressed the view that this is potentially problematic. Discussions with interview participants indicated water sector priorities are on maximising benefits from water supplies through construction of several large hydropower plants and new investments in irrigated farming. Alongside this, we learned in one interview of promising activities aimed at improving water use efficiency mainly in relation to livestock and rice production.

Environmental health challenges in Tanzania seem centred on water-borne and zoonotic diseases. In one interview, a stakeholder explained that irrigation expansion is known to
increase dispersal of diseases such as malaria and pollutants in watercourses, whilst conversely malaria control sprays, when mishandled, act as a pesticide and pollutant. This participant explained that national health bodies focus on managing communicable diseases at the project implementation phase, mainly through control of vectors.

Indicators that are already in use, or could be useful, for planning and monitoring to achieve multi-sectoral development and conservation targets

Indicators mentioned as currently in use to monitor project outcomes were focused on individual and livelihood-level impacts, such as household income, crop yield and losses, livestock productivity, and disease incidence (in humans and crops/livestock). Gender and age disaggregated indicators, such as the impact of an intervention on employment opportunities for women and youth, were highlighted as important in two interviews. However, across the interviews, stakeholders pointed out the limited availability of baseline environmental data, such as on water quality and levels, and the difficulty this poses for monitoring project impacts. For example, one participant highlighted the progress that has been made in integrating environmental issues into national plans but pointed to the lack of data at sub-national (particularly local) levels as a major constraint to implementing poverty-environment indicators, and therefore to enabling evidence-based decision-making on sustainable development.

Decisions must often be made without information, or as one participant put it: “the cart is in front of the horse”.

ES that were of cross-sector interest include: land degradation control (particularly in areas of high fertility), and sedimentation control in relation to hydropower and irrigation potential. Infiltration and flood mitigation services were of interest to the health sector in relation to the spread of water-borne diseases. There was a high level of interest in all sectors for indicators that show impacts on human well-being and livelihoods, such as number of children with stunted growth, yield per ha change in agricultural input, % population with access to safe drinking water.

Stakeholder interest in and potential utility of the MESH tool

As mentioned above, the availability and quality of data were mentioned as a huge challenge in Tanzania, a view that was echoed across the interviews. Participants expressed strong interest in having a tool that could help close data gaps, particularly if data could be disaggregated to the village or district level. One participant was of the view that: “Any initiative to improve data quality in this country would be welcome, at whatever level”. However, another stakeholder thought that linking changes in ES to SDG targets would only be helpful if the SDG targets were clearly aligned to national priorities; in other words, linking ES directly to national targets could be a better way forward.

4. Discussion
Interviews with stakeholders across all three countries indicated that an ES modelling tool mapped to SDG-relevant indicators, such as the MESH toolkit, has several potential uses. Interest in the tool focused around its uses for:

- monitoring and accounting for project impacts and outcomes, particularly to support funding applications and reporting;
- collecting information on trends in ES supply and associated benefits to inform land use planning and crisis preparedness; and
- capturing the economic and non-economic value of ecosystem changes to strengthen the evidence-based for conservation initiatives.

However, linking ES change to established national-level targets (which may or may not align well with the SDGs) would be considered more effective by some stakeholders. Several stakeholders were of the view that demonstrating the economic value of ES was more pressing than any other valuation methods, because actual or perceived financial trade-offs are the limiting factor to conservation action.

Information gathered through this consultation indicates that effectively demonstrating the impacts of ecosystem change on livelihoods could inform decision-making at multiple levels. For example, one participant explained that understanding the value of ecosystem services to agriculture could change household-level choices: "In rural areas, the main livelihood is agriculture and there are no alternative jobs so fighting back against forest encroachment is difficult". This participant was of the view that knowledge of ecosystem services can motivate sustainable ecosystem use for the benefit of agriculture and conservation, explaining that where there is traditional knowledge about the value of using organic matter instead of synthetic fertilisers for long-term soil fertility, people are more likely to retain forest patches on their land.

At the national or project level, several stakeholders conveyed that ecosystem degradation from large-scale infrastructure could be reduced by demonstrating the investment returns or benefits from sustainable ecosystem management to the infrastructure beneficiaries, such as conveying the effect of upstream land management on energy production to hydropower beneficiaries.

Participants pointed out several challenges to cross-sector communication, some of which may be reduced if the outputs of the MESH tool can be expressed in a way that is comprehensible and meaningful to actors multiple sectors. For example, one stakeholder described how working across ministries could be challenging because of the "high turnover of staff", and emphasised that a lack of understanding within a given sector of other sector issues making it difficult to communicate problems and find potential win-win solutions. However, the utility of the MESH tool, as with any other tool for identifying trade-offs between goals, is likely to work best where there are strong and positive relations between cross-sector actors to enable an open discussion about sometimes novel intervention options, and agree which works best the country as a whole.

Coordinating organisations, such as the Sécretaire Permanent du Conseil national pour l’environnement et le développement durable in Burkina Faso, the National Development Planning Commission in Ghana, the Vice President’s Office and the Planning Commission in...
Tanzania, and the Volta Basin Authority, may benefit from using a tool like the MESH to facilitate multi-sector negotiations. In this regard, interview participants provided several useful suggestions for facilitating use of the MESH toolkit by policy-makers and ensuring the tool evolves to meet policymaker needs, including: i) engaging in-country post-graduate students in trial-use and in any further work to develop the tool; and ii) providing formal training and developing partnerships to run the tool on actual intervention decisions in-country.

Finally, we prioritised securing interviews with government-sector representatives to understand the potential value of the MESH tool to policymakers. We suggest that an analysis of private sector, civil society and donor organisation perspectives on the relevance of the SDGs to project-level decision-making is needed to gauge the full potential of the MESH tool.
5. Conclusions and next steps

Results from the stakeholder consultation are informing the design of the MESH tool, which is well-underway. The prototype model will be presented at a workshop in Rome, July 2015. In discussion with national-level stakeholders at the July meeting, we intend to trial-run the tool in late 2015 for a water management intervention in the Volta Basin. This will be followed by further testing and refinement of the model design, with a view to releasing the MESH toolkit in January 2016 when the SDGs come into force.
Annex 1: Potential ES indicators

List of potential ES indicators derived by the research team based mainly on a review of academic literature.

<table>
<thead>
<tr>
<th>Target themes</th>
<th>Ecosystem Service</th>
<th>Indicator</th>
<th>Interest</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SDG 2: Agriculture and Food Security</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1) Access to safe, adequate and nutritious foods year round</td>
<td>Pest control</td>
<td>• Avoided crop losses</td>
<td>☐</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Reduced pesticide use</td>
<td>☐</td>
</tr>
<tr>
<td></td>
<td>Pollination</td>
<td>• Increased pollinator-dependent crop production (measured in yield, calories or nutrients)</td>
<td>☐</td>
</tr>
<tr>
<td>2) End all forms of malnutrition</td>
<td>Crop and livestock diversity</td>
<td>• Caloric &amp; nutrient production on landscape (per capita)</td>
<td>☐</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Dietary diversity</td>
<td>☐</td>
</tr>
<tr>
<td>3) Double agricultural productivity and incomes</td>
<td>Wild food availability</td>
<td>• Dietary diversity</td>
<td>☐</td>
</tr>
<tr>
<td></td>
<td>Water regulation</td>
<td>• Avoided land degradation from erosion and salinization</td>
<td>☐</td>
</tr>
<tr>
<td><strong>SDG 3: Health and communicable diseases</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1) Reduce number of deaths and illnesses from hazardous chemicals, and air, water and soil pollution and contamination</td>
<td>Air quality (trees)</td>
<td>• Population exposure to low air quality (particulate matter)</td>
<td>☐</td>
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<tr>
<td></td>
<td>Water quality (filtration)</td>
<td>• Amount drinking water that meets national standards</td>
<td>☐</td>
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<tr>
<td></td>
<td>Nutritional functional diversity of food production system</td>
<td>• Dietary diversity</td>
<td>☐</td>
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<td></td>
<td></td>
<td>• Reduced anaemia</td>
<td>☐</td>
</tr>
<tr>
<td>2) Reduce non-communicable diseases and promote mental health and well-being</td>
<td>Standing bodies of water and flood risk</td>
<td>• New exposure rate to malaria vectors</td>
<td>☐</td>
</tr>
<tr>
<td>3) Reduce malaria, waterborne diseases, neglected tropical diseases and other communicable diseases</td>
<td>Intact tropical forest</td>
<td>• New exposure to potential emerging zoonotic diseases</td>
<td>☐</td>
</tr>
<tr>
<td></td>
<td>Air temperature regulation</td>
<td>• Avoided heat-stress related health impacts</td>
<td>☐</td>
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<tr>
<td><strong>SDG 6: Water Quality and Availability</strong></td>
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<tr>
<td>1) Access to safe and affordable drinking water</td>
<td>Water flow regulation (Water quantity)</td>
<td>• Per capita water availability</td>
<td>☐</td>
</tr>
<tr>
<td>2) Improve water quality by reducing pollution, dumping and release of hazardous chemicals</td>
<td></td>
<td>• Population with adequate supply of drinking water</td>
<td>☐</td>
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<tr>
<td></td>
<td></td>
<td>• Frequency of inland flood events</td>
<td>☐</td>
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<tr>
<td></td>
<td></td>
<td>• Days of navigable river travel</td>
<td>☐</td>
</tr>
<tr>
<td>3) Sustainable water withdrawals and supply</td>
<td>Nutrient and sediment</td>
<td>• Days water quality meets national drinking standards</td>
<td>☐</td>
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<tr>
<td>SDG 13: Climate Change</td>
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<tr>
<td>4) Protect restore water-related ecosystems</td>
<td>retention (Water quality)</td>
<td>Areal extent of waterbodies experiencing eutrophication</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Vegetation cover &amp; infiltration</td>
<td>Increase in groundwater recharge rates / extraction</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Multiple ES</td>
<td>Extent of water bodies degraded</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SDG 15: Protect Terrestrial Ecosystems</th>
<th></th>
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</thead>
<tbody>
<tr>
<td>1) Halt deforestation, and increase reforestation</td>
<td>Carbon sequestration</td>
<td>Avoided carbon loss</td>
</tr>
<tr>
<td></td>
<td>N/A (direct land use change)</td>
<td>Avoided deforestation</td>
</tr>
<tr>
<td></td>
<td>Habitat provision, diversity and structure</td>
<td>Areal extent of avoided habitat loss</td>
</tr>
<tr>
<td></td>
<td>Erosion Prevention</td>
<td>Area of avoided degraded land</td>
</tr>
</tbody>
</table>
Annex 2: Project briefing note
Project briefing note provided to interview participants.
Briefing Note on the SNAP research project on Making Ecosystems Count in the Sustainable Development Goals: Using ecosystem services for sustainable development

What are we doing?

The Science for Nature and People (SNAP) working group on Making Ecosystems Count in the Sustainable Development Goals (SDGs) is working to strengthen existing ecosystem-based decision-support tools to make them more relevant to national-level development policy and investment decisions. We aim to identify which and to what extent the benefits ecosystems provide to people, or “ecosystem services”, are important for achieving the targets embedded in the proposed SDGs, and how far the links between ecosystem services and the SDGs can be assessed, modelled and monitored to inform development decision-making and reporting requirements.

Why is this important?

Attempts to achieve sustainable development can be helped or hindered by the important but often unseen and undervalued ways in which humans rely on natural ecosystems for their social and economic well-being. These relationships are directly and indirectly affected by ecosystem management choices, including decisions about activities that are not ecosystem-focused but that significantly alter the natural environment, such as major infrastructure projects to construct hydropower plants, extensive agricultural production zones, regional irrigation systems or major transportation routes. Where the inter-relationships between ecosystem management and development goals can be identified and monitored, this knowledge could be used to inform development policies and investments for major infrastructure projects and conservation initiatives.

For example, reducing communicable tropical diseases such as malaria is a health-related development goal - currently included under SDG3 - that partly depends on the abundance of disease vectors. These vectors can be reduced through selective management of breeding habitat such as the extent and number of standing waterbodies supporting malaria-carrying mosquitoes. However, standing waterbodies can be important sources of food for local people, irrigation water, and provide habitat for pest-predators that are important in crop production. Therefore, management of ecosystems to reduce malaria should be approached in discussion with decision-makers aiming to achieve food security goals to identify potential trade-offs. Decision-support tools developed to identify where and to what extent waterbodies are important for improved health, food security and other development priorities could be used to show the trade-offs and synergies across development targets for different ecosystem management options. In this way, national-level development policy and investment decisions that alter the natural environment can be made to maximise the development benefits, and minimise negative impacts, of these ecosystem changes on development goals.

Many tools exist to model ecosystem services across a landscape, and some tools attempt to capture their value to people. Examples of such tools include the Natural Capital Project’s Integrated Valuation of Environmental Services and Tradeoffs toolkit (InVEST), the Artificial Intelligence for Ecosystem Services (ARIES) and the Multiscale Integrated Models of Ecosystem Services (MIMES), to name a few. While existing tools can be very useful for understanding the supply of ecosystem services and the
opportunities for ecosystem restoration or conservation, they do not explicitly illustrate the impact of ecosystem change on the human health and livelihood targets embedded in the SDGs, nor the trade-offs between these targets under different ecosystem management scenarios. Our aim is to identify opportunities, constraints and limitations to deriving these outputs and making existing ecosystem-based decision-support tools more relevant to sustainable development.

Figure 1 provides an illustrative example of how existing ecosystem service assessment tool outputs might be extended to demonstrate the development-relevance of ecosystem management options.

**Figure 1: Ecosystem services and development targets.** Each map indicates percent change in an ecosystem service for subwatersheds under two scenarios (Vision and Plan) for management of tiger habitat in Sumatra, while the arrows and labels at the base of the diagram illustrate a potential way of linking these ecosystem service changes to sustainable development targets (figure adapted from Bhagabati et al. 2014).
What is our approach?

We are seeking to understand:

i) which and to what extent the many links between ecosystem change and national-level development targets - particularly those related to health, water and agriculture – are of interest to national government, development investors and other development stakeholders;

ii) how far these impacts on human wellbeing can be measured using available scientific and local knowledge and data availability; and

iii) how these measurements can be expressed and visualised to make them valuable and relevant to development decision-making and reporting on development outcomes.

To address these questions, we are using a combination of systematic scientific literature reviews, workshops with ecosystem service and development experts from academia and global policy, and face-to-face consultations with organisations and institutions that set or shape national policies and investments decisions, or who are accountable for meeting national development goals, in selected case study countries.

With the findings of this research, we intend to broaden the assessment and valuation capacity of the well-established InVEST ecosystem service assessment toolkit, and explore opportunities to apply and improve visualisation techniques to make them more appropriate to sustainable development decision-making, by:

i) deriving indicators where we are able to identify links from ecosystem services directly to sustainable development targets using outputs of InVEST models;

ii) here we are unable to link the outputs of existing InVEST models to development outcomes, adjusting or, if the project timescales permit, developing new InVEST tools to model the effect of ecosystem change on selected ecosystem services of relevance to the SDGs; and

iii) reviewing existing and exploring new approaches to visualise the links between ecosystem service outputs and development targets.

What are the expected project outcomes?

The research findings will be used to propose:

- a suite of indicators linking ecosystem services to development targets for the case study countries;
- to identify decision-relevant methods for visualising these indicator values; and
- to determine priority actions for further improving ecosystem-based decision-support tools for national development priorities.

We envisage that stakeholders responsible for setting or shaping sustainable development policy and investment decisions, and those policymakers that are accountable for achieving sustainable development commitments may find the outputs of this project useful. This includes government ministries (e.g. agriculture, water, health and environmental departments), international organizations and civil society organisations working in development or conservation, and major donor institutions or private businesses interested in sustainable development projects.

We welcome engagement with any organisation with an interest in this project. For further information, please contact the Principal Investigator, Fabrice DeClerck: f.declerck@cgiar.org / 0033 (0)4 67 61 29 09.
Annex 3: Consultation participants

List of institutions interviewed as part of the consultation, and sector / organisational classifications used for purposes of this report.

<table>
<thead>
<tr>
<th>Organisation</th>
<th>Country</th>
<th>Organisation type</th>
<th>Sector</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food &amp; Agriculture Organization (FAO)</td>
<td>Tanzania</td>
<td>International Organisation</td>
<td>Agriculture</td>
</tr>
<tr>
<td>Kilimo Trust</td>
<td>Tanzania</td>
<td>Civil Society</td>
<td>Agriculture</td>
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<td>Agriculture</td>
</tr>
<tr>
<td>Nile Basin Initiative</td>
<td>Tanzania</td>
<td>International Organisation</td>
<td>Water</td>
</tr>
<tr>
<td>Rufiji Basin Development Authority (RUBADA)</td>
<td>Tanzania</td>
<td>Sub-national government</td>
<td>Water</td>
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<td>Tanzania</td>
<td>International Organisation</td>
<td>Environment</td>
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<tr>
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<td>Tanzania</td>
<td>International Organisation</td>
<td>Development</td>
</tr>
<tr>
<td>World Bank</td>
<td>Tanzania</td>
<td>Donor</td>
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<tr>
<td>Food &amp; Agriculture Organization</td>
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<td>International Organisation</td>
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</tr>
<tr>
<td>Ghana Irrigation Development Authority</td>
<td>Ghana</td>
<td>National government</td>
<td>Water</td>
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<tr>
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<td>The Forestry commission of Ghana (Civic Response)</td>
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<td>Environment</td>
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<td>Research Institute</td>
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