World Bank Landscape Projects: What Role for Natural Capital Accounting?

Stefano Pagiola
Shun Chonabayashi

Global Platforms Unit
Environment, Natural Resources and the Blue Economy Global Practice
World Bank

Paper prepared for presentation at:
4th Forum on Natural Capital Accounting For Better Policy
Measuring and Valuing Natural Capital to Improve Landscape Management and Governance
Kampala, Uganda, 18-19 November, 2019

REVISED DRAFT — 14 November 2019

Abstract

The landscape approach refers to taking both a geographical and socio-economic approach to managing land, water, and forest resources that form the foundation for meeting the goals of food security and inclusive green growth. This note reviews the World Bank's portfolio of active landscape management projects and examines how Natural Capital Accounting (NCA) data could contribute to their design and implementation. Although NCA efforts are too recent, in most cases, to have played a role in current landscape projects, their experience shows that NCA could be extremely useful to landscape projects at all stages, from the policy dialog that precedes the decision to undertake a project, through project design and implementation, and even long after the project has ended. However, the mere existence of NCA might not be sufficient. NCA can be conducted in a number of ways and all may not be equally useful for different types of landscape projects. The note discusses how NCA measurement efforts might be designed to be most useful to landscape projects, highlighting the importance of undertaking NCA at an appropriate level of spatial disaggregation, and of making available the data and models used to construct the accounts.

World Bank Landscape Projects: What role for Natural Capital Accounting?

Introduction

The landscape approach refers to taking both a geographical and socio-economic approach to managing land, water, and forest resources that form the foundation for meeting the goals of food security and inclusive green growth. It is about land use planning and then connecting protected areas, forest, woodlands, agro-silvo-pastoral lands, watersheds, croplands, and irrigated agricultural lands for the provision of ecosystem services (ES), adaptation to climate change, and increased productivity.

The World Bank Group has started to use landscape approaches in its lending and non-lending programs, promoting integrated management of land, water, and living resources, and their sustainable use and conservation. By taking into account the interactions between these core elements of natural capital and the ecosystem services they produce in designing development projects, rather than considering them in isolation from one another, the landscape approach provides opportunities in maximizing productivity, improving livelihoods, and increasing the production of ecosystem services.

This note reviews the World Bank's portfolio of active landscape management projects and examines three main questions:

- What role has Natural Capital Accounting (NCA) data played in the design and implementation of landscape projects?
- What does the experience of current projects show about how NCA data could contribute to developing and improving landscape projects?
- How might NCA measurement efforts be designed to be most useful to landscape projects?

World Bank Landscape Projects

We begin the analysis by taking stock of World Bank projects that use a landscape approach. The projects reviewed include all projects listed as having a 'landscape management' theme in the Bank's internal Operations Portal that were approved during the fiscal years 2016 through 2019.[1] Themes are assigned to projects by a Central Coding Team and then submitted to Task Team Leaders (TTLs) for their review and approval.[2] A full list of these projects is given in Annex Table A1. There is a total of 62 projects that meet the above criteria. However, some projects that are listed individually in the portal are essentially one project, with separate listings for different funding sources (for example, one P code for the Bank loan or IDA credit and a separate P code for a GEF grant). These different project codes for a single project have been combined for the review, bringing the total number of projects to 58 projects.[3]

---

[1] The World Bank's fiscal year (FY) begins on July 1 and ends on June 30.

[2] Codes are initially assigned at the Project Concept Stage and then reviewed after Project Approval. TTLs are notified of the coding reviews for their projects at each stage and may propose changes to the assigned codes.

[3] The projects combined are as follows: *Zambia Integrated Forest Landscape* (P157521/P161490), *Madagascar Sustainable Landscape Management* (P154698/P157909), *Moldova Climate Adaptation* (P155968/P163720), and

There is no official definition of 'landscape projects' within the Bank, nor is there a single widely accepted definition of the 'landscape approach' or 'integrated landscape management (ILM)' in the literature.[4] In general, landscape projects differ from traditional rural development or conservation projects by considering multiple land uses and the interactions between them and the effects of these land uses outside the immediate project areas—for example, through their impacts on ES such as hydrological services, biodiversity conservation, or carbon sequestration). Several projects that are tagged as having a landscape management theme do not meet any reasonable definition of landscape projects as they do not deal with land use at all. They have been omitted from the review[5], leaving a total of 54 projects.

The remaining 54 projects include many that follow some form of landscape approach and consider interactions between landscape elements and effects beyond the project, and some that are arguably standard rural development or conservation projects rather than landscape projects. In many cases, the PADs of the latter projects do not even include the word 'landscape' except in a generic sense. These projects are retained in the sample, but as a subset.[6] It is important to note, however, that some projects that appear narrowly focused are considered as landscape approach projects if they are part of a broader program addressing landscape issues.[7] The analysis focuses on the narrower set of 'landscape approach' projects, but sometimes covers the entire group of 'landscape-themed' projects.

Our sample thus includes 44 projects that follow a landscape approach ('landscape projects' hereafter). The main characteristics of this sample are summarized in Table 1. Note that, except for Africa (AFR) and Latin America and the Caribbean (LCR), most regions have few landscape projects, and so the regional averages in the discussion below can be heavily affected by individual, possibly idiosyncratic projects. It is interesting to note that 14 of the projects that follow a landscape approach are additional financing to earlier projects.

Haiti Resilient Productive Landscapes (P162908/P165551). For these projects, the shares assigned to sectors and themes are the averages of two projects weighted according to gross commitments.

[4] Annex Table A2 lists the definition of 'landscape approach' used in the projects that provided one; however, many did not.

[5] They are: *China Hebei Air Pollution Prevention and Control Program* (P154672), which focuses solely on air pollution; *Kenya Electricity Expansion* (P153179), which focuses solely on electricity production and distribution; *India Bihar Transformative Development* (P159576), which focuses solely on nutrition; and S*ri Lanka Transport Connectivity and Asset Management* (P132833), which focuses solely on roads. Omitting these projects does not imply any judgement on their quality, but simply that they are not landscape projects.

[6] They are: *Belarus Forestry Development* (P165121); C*had Emergency Food and Livestock Crisis Response* (P163258); *India Himachal Pradesh Horticulture Development* (P151744); *Niger Community Action Phase 3* (P163144) and *Community Action Project for Climate Resilience* (P165397); N*igeria Third National Fadama Development* (P158535); *Rwanda Transformation of Agriculture Sector Program 4 Phase 2* (P161876), *Transformation of Agriculture Sector Program Phase 2* (P169514), and *Transformation of Agriculture Sector Program Phase 3* (P161000); and *Uganda Development Response to Displacement Impacts in the HoA* (P164101). Again, treating these projects separately does not imply any judgement on their quality, but simply that they are not landscape projects.

[7] The *Mozambique Conservation Areas for Biodiversity and Development - Phase 2 Project* (P166802) is an example of a project that, on its face, appears to be a traditional conservation project, but that is considered to be a landscape approach project because it is part of a broader landscape program. See also Figure 11 below.

Table 1: Landscape projects approved in FY16-19

	Follow landscape approach	*All landscape-themed*
Number of projects	44	54
Gross commitments (USD million)		
Total	3,554	4,162
Average	81	77
Minimum	6	5
Maximum	500	500
Projects by region		
Africa (AFR)	23	31
East Asia and Pacific (EAP)	3	3
Europe and Central Asia (ECA)	2	3
Latin America and Caribbean (LCR)	11	11
Middle East and North Africa (MNA)	1	1
South Asia (SAR)	4	5
Projects by FY		
2016	5	7
2017	12	14
2018	16	19
2019	11	14

Figure 1 shows the number of landscape approach projects approved in each fiscal year by region, and Figure 2 shows the corresponding total commitments. The number of landscape projects grew from fiscal 2016 to fiscal 2018. It dropped slightly in fiscal 2019, but this may well reflect the vagaries of pipeline development and board approvals rather than any change in overall trends. To support this point, Figure 2 shows that total commitments to landscape projects have continued to grow.

Figure 3 shows the size of individual landscape projects (commitments on the vertical axis are shown using a log scale). Most landscape projects have commitments of between USD10 million and USD100 million, with a few smaller projects and a few much larger projects[8]. As can be deduced from Figure 3, the increase in total commitments in recent years was driven in large part by a few very large projects approved in FY18 and FY19.

[8] Including the USD400 million additional financing to the *Nigeria Erosion and Watershed Management* (P164082), approved in FY18, and the USD500 million *Ethiopia Climate Action Through Landscape Management PforR* (P170384) and USD350 million *Ethiopia Lowlands Livelihood Resilience Project* (P164336), both approved in FY19.

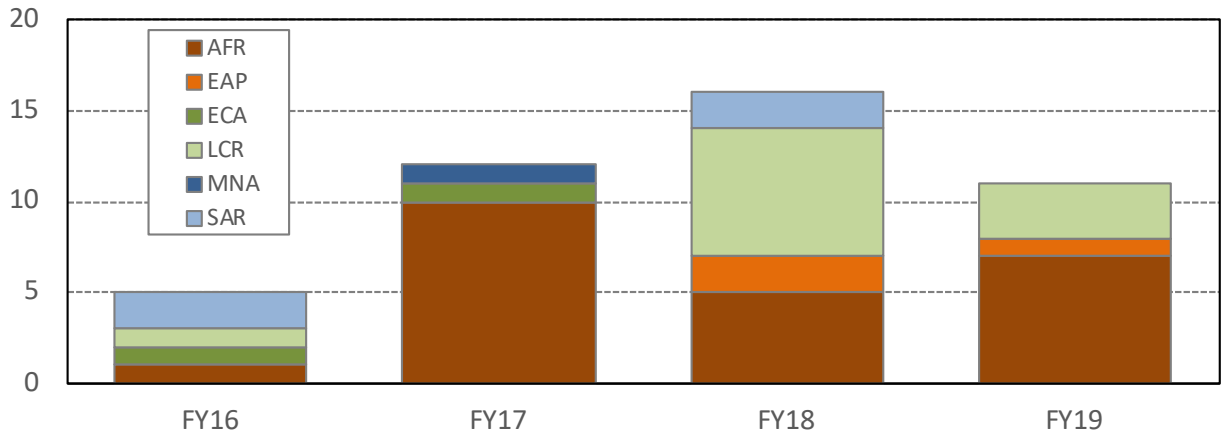


Figure 1: Number of Landscape projects approved, by fiscal year and region
(number of projects)

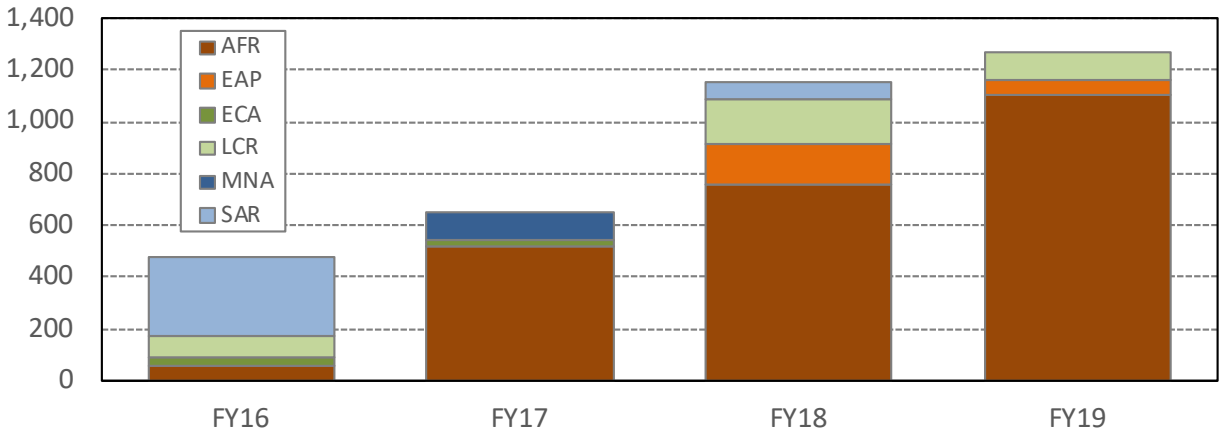


Figure 2: Commitments under Landscape projects approved, by fiscal year and region
(USD million)

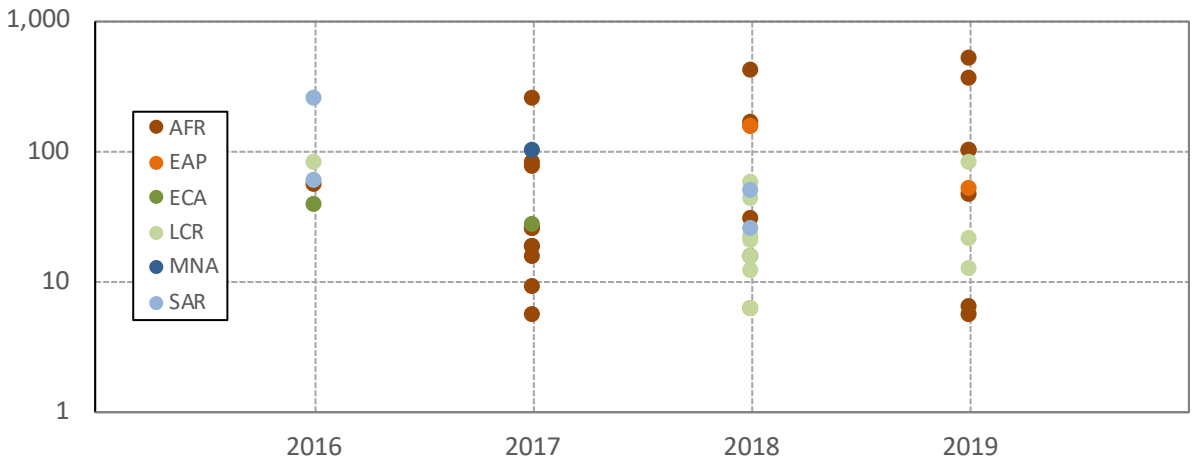
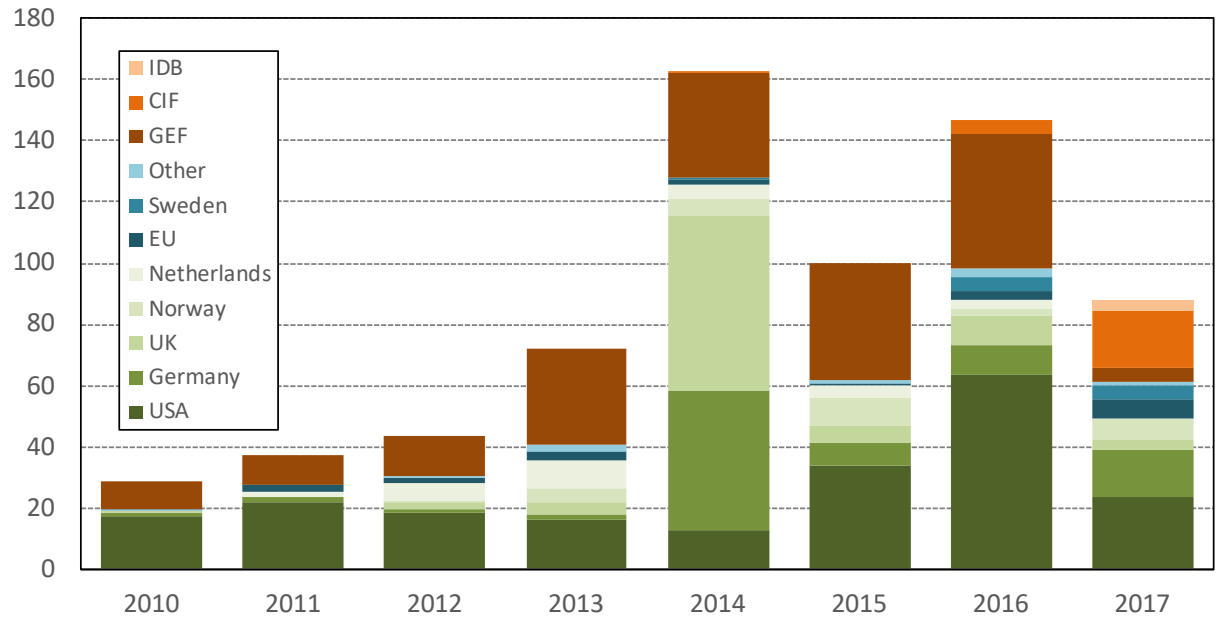


Figure 3: Size of individual landscape projects approved, by FY and region
(log USD million)

The increase in interest in landscape projects has not been limited to the World Bank. Figure 4 shows total commitments to landscape projects by donors from 2010 to 2017, based on data in the OECD Creditor Reporting System (CRS) database.[9] The United States was the largest donor for landscape projects in this period, committing a total of USD208 million, followed by Germany (USD84 million), the United Kingdom (USD82 million), Norway (USD29million), the Netherlands (USD27 million), the European Union (USD19 million), and Sweden (USD10 million). Among multilateral agencies, the Global Environment Facility (GEF) provided the most funding for landscape projects in this period, with USD184 million, followed by the Climate Investment Fund (USD24 million).



Source: Based on data in OECD Creditor Reporting System (CRS) database.

Figure 4: Commitments to landscape projects, 2010-2017, other donors and multilateral development banks
(USD million)

Methodology

Our review is based on the Project Appraisal Documents (PADs), or on the Project Papers (PPs) in the case of Additional Financing (AF). This imposes limitations, in that PADs do not necessarily cover all the aspects that are of interest. In particular, the methodologies and data sources used in project preparation are not always described in detail. The PPs are especially problematic in this regard, as they often have even less detail than PADs; where possible, we have also reviewed the PAD of the original project, but this was not always feasible. Because of these limitations, it should be borne in mind throughout the discussion below that this note probably undercounts the extent to which different aspects are present in landscape projects.

[9] This analysis is based on projects with a title that includes a word 'landscape' but does not include modifiers to the word 'landscape' such as 'political', 'industrial', 'cultural', etc. Only the ten largest financing sources for landscape projects are shown.

A separate issue is that reductions in the time and resources available for project preparation mean that many activities that might previously have been undertaken during preparation are now undertaken in the early phases of implementation. Several projects, for example, defer the choice of project areas and/or of specific activities to be supported to the implementation phase. In such cases, the PADs will necessarily have no information on these aspects beyond the general principles to be applied.

Objectives of landscape projects

Many projects use a landscape approach because of the perceived limitations of narrower approaches. In Madagascar, for example, a succession of projects seeking to increase the productivity of irrigated areas had resulted in very little improvement. This was thought to be due to degradation of the surrounding watersheds (caused, at least in part, by people seeking additional income because of the low productivity of irrigated areas) damaging downstream irrigation infrastructure and reducing water availability. Only by addressing the entire landscape, including both downstream and upstream areas, could these problems be resolved. Accordingly, the *Sustainable Landscape Management Project* (P154698/P157909) addresses upstream, midstream, and downstream parts of select watersheds. Similarly, conservation projects have come to realize that effective conservation requires also working with populations in the surrounding areas (and sometimes within the protected areas themselves) to reduce threats and increase connectivity.

That said, the increased scope of activities does not necessarily imply a change in fundamental objectives as stated in the Project Development Objectives (PDOs). The PDOs of the landscape approach projects are listed in Annex 3. Many of these PDOs would not have been out of place in traditional rural development or conservation projects.

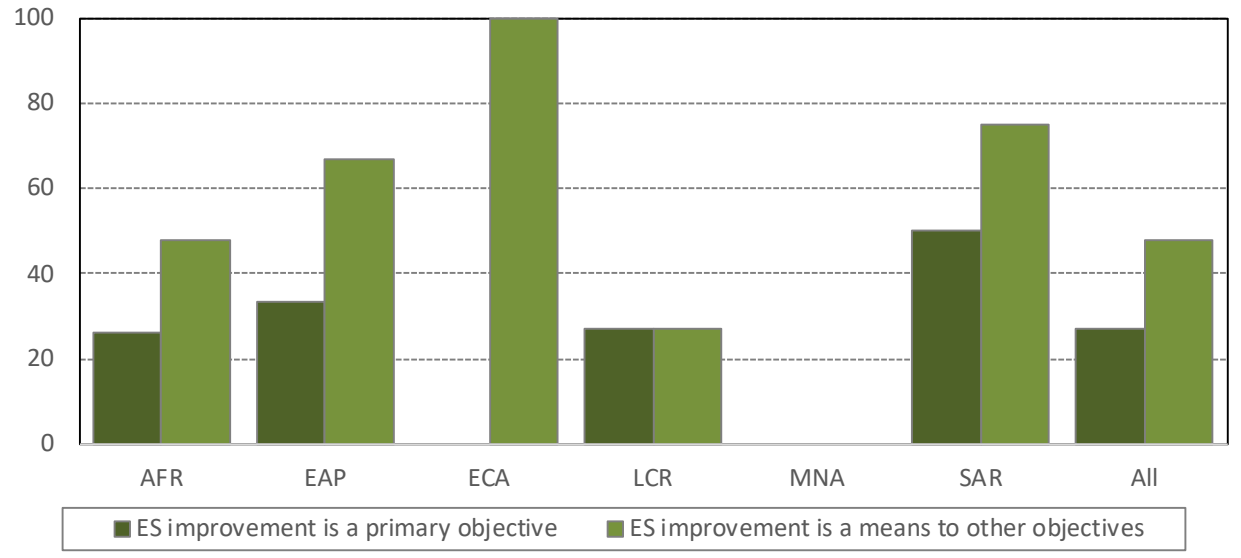


Figure 5: Ecosystem service improvement as an objective in landscape approach projects (% of projects reviewed)

Figure 5 shows the extent to which ES improvement is either a primary objective of landscape projects (in which case, the focus is usually on conserving biodiversity or sequestering carbon) or a means to achieve other objectives (for example, many projects seek to improve hydrological services so as to increase yields in downstream irrigated areas, extend the life of reservoirs, or reduce flood risk). Overall, about a quarter of landscape projects seek to improve ES as an end in itself and about half seek to improve ES as a means to other ends; of course, a given project could do both.

It should be noted that even when ES improvement is a primary objective, it is rarely included in PDO statements. As per current guidance, PDOs have to reflect first order results of project interventions and thus are worded as short- and medium-term outcomes. Most ES are highly variable and occur beyond the project period and thus carry potential attribution problems.[10] As a result, PDOs usually do not refer to ES objectives explicitly but may mention them in the section on Higher-Level Objectives and/or in the Theory of Change as long-term outcomes (impacts).

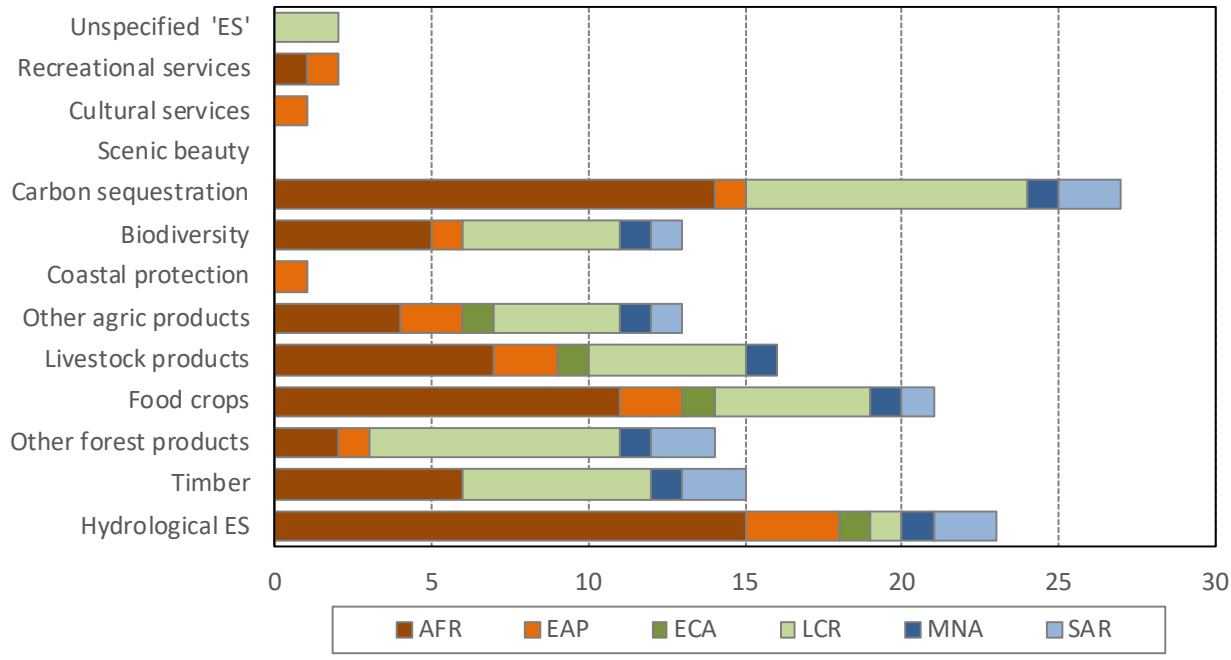


Figure 6: Ecosystem services targeted for improvement in landscape approach projects (number of projects)

Figure 6 shows the specific ecosystem services targeted for improvement in landscape approach projects. Of course, any changes in land use are likely to affect a broad range of ES, whether such an effect is intended or not.[11] However, Figure 6 only includes ES that the project explicitly seeks to improve or for which it states that it expects an improvement. Provisioning services of various kinds (food crops, timber and other forest products, livestock, etc) are the single most important

[10] Likewise, objectives such as reducing poverty or increasing income are also not often stated explicitly in PDOs, for similar reasons.

[11] The Environmental Assessment is intended to identify potential adverse effects so that the project design may be modified to avoid or mitigate such effects.

objective in most landscape projects. Carbon sequestration is included in the largest number of projects (27, or 61 percent of all projects reviewed), although in many cases it is not explicitly targeted in itself, but is a by-product of activities undertaken for other reasons. Its importance in the sample is due to the mandate that all projects should seek to estimate their contribution to mitigating climate change and the availability of the EX-ACT tool to do so. Hydrological benefits of some kind are the second most common ES (see below for more details), with 23 projects (52 percent) targeting at least one hydrological benefit. Biodiversity conservation is mentioned in 13 projects (30 percent), many of which are GEF-financed. Cultural and recreational services and coastal protection are mentioned in only a few projects.

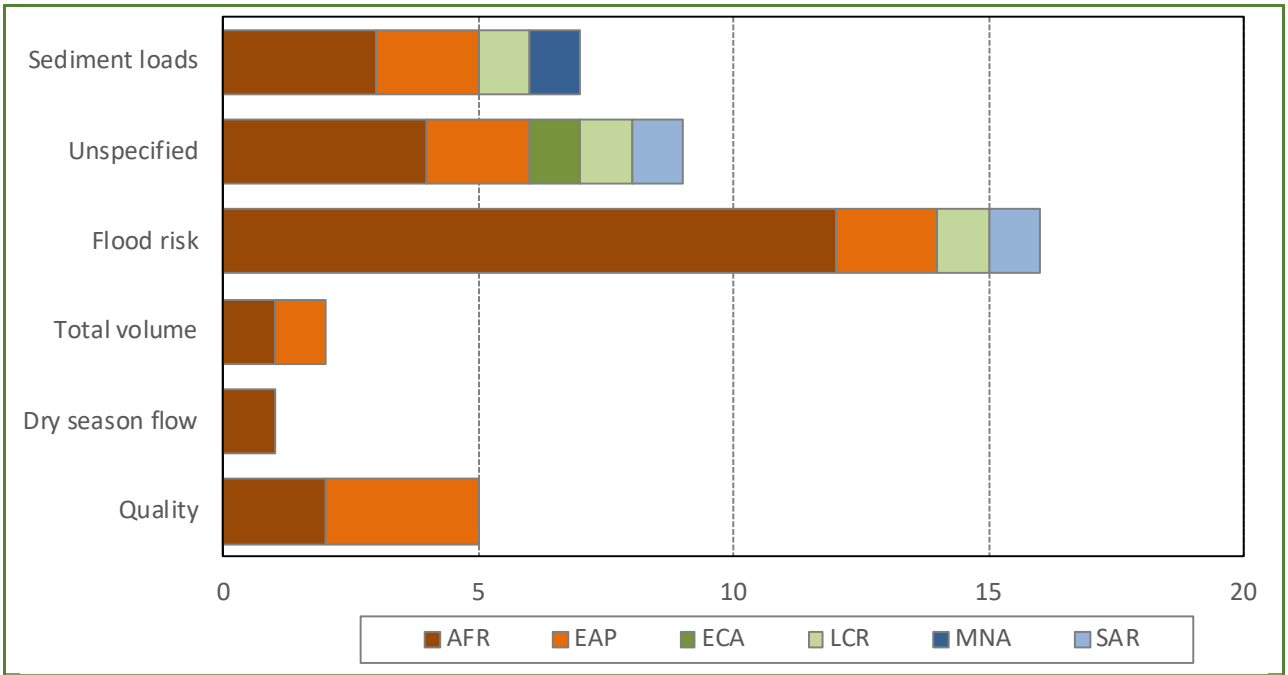


Figure 7: Hydrological services targeted for improvement in landscape approach projects (number of projects)

Hydrological services are the ES that is most often targeted for improvement: half of landscape approach projects explicitly seek to improve hydrological services in some way. Hydrological services are important for well-being, irrigation, industrial production, recreation, and many other purposes. Depending on the specific use, different aspects of water may be more important than others. Although some projects only consider 'hydrological services' in general, others are quite specific about seeking to improve water quality, dry season flow, or total flow, or to reduce flood risk or sediment loads. Figure 7 shows the specific hydrological services that projects seek to improve; again, only effects that are explicitly mentioned are included. Note also that many projects named more than one specific hydrological service. Reducing flood risk is the single most mentioned benefit by 16 projects (36 percent of all landscape approach projects, 70 percent of projects that target hydrological services). Reducing sediment loads that affect downstream reservoirs is mentioned by 7 projects (16 percent of all landscape approach projects, 30 percent of projects that target hydrological services). Other hydrological services are mentioned less often.

Despite the high level of interest in water services, there is very little apparent effort to quantify them. Many hydrological models are now available (InVEST, SWAT, etc.), but only one project reported using a hydrological model, the *China Zhejiang Qiandao Lake and Xin'an River Basin Water Resources and Ecological Environment Protection Project* (P159870), which used SWAT to identify priority areas for inclusion and plans to use it for monitoring results (see below).

One important constraint here is that the time and resources available for such modeling are very limited. NCA could help provide such information without taxing project preparation resources. WAVES efforts have often focused on water accounts and estimates of the value of ecosystems such as forests and have often included their effects on water services. In the absence of NCA initiatives, other efforts have sometimes been made to generate the required data. Thus extensive analytical work has recently been conducted in Pakistan and Nepal, using modeling tools to develop cost-effective catchment area management plans in selected catchments so as to improve the sustainability of hydropower plants.[12]

Expected beneficiaries

Figure 8 shows the expected beneficiaries of the landscape approach projects (again, only beneficiaries that are explicitly mentioned in PADs are included). All but three projects name land users as the primary—in many cases, the only—direct beneficiaries of the project. Downstream service users (for example, irrigation systems, HEP plants, potable water supply systems) and people at risk of flooding are other important expected beneficiaries.

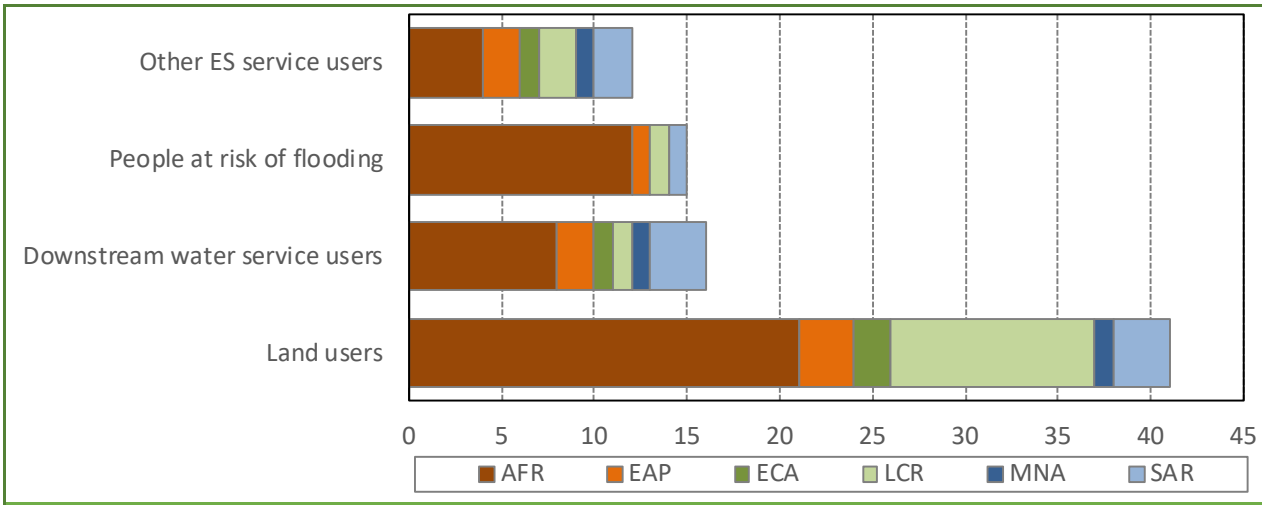


Figure 8: Expected beneficiaries in landscape approach projects
(number of projects)

Activities

Figure 9 shows the distribution of activities in landscape approach projects, according to the level 2 sector coding in the Operations Portal. By their nature, landscape projects include a broad array

[12] See: World Bank. 2019. "Valuing Green Infrastructure: Case Study of Kali Gandaki Watershed, Nepal." Washington: World Bank; and World Bank. 2019b. "Valuing Green Infrastructure: Case Study of Mangla Watershed, Pakistan." Washington: World Bank.

of activities. Overall, activities focusing on land use (crops, livestock, forestry, etc.) account for a little under half of total commitments (see below for greater details), but this varies across regions, with the proportion being lower in LCR and MNA and higher in other regions. Agricultural support (for example, technical assistance) and commercialization (for example, improvements to the value chains of agricultural, forest, or fishery products) complement these activities, accounting for a little under a fifth of all activities, although their share is very low in SAR and EAP. Other common elements include investments in irrigation and drainage (which is particularly significant in LCR) and in public administration (which is significant in all regions except EAP and ECA). Roads form a very large component of commitments in SAR, but this is driven by a single project with a large road component. A variety of other activities (such as investments in energy, water supplies, sanitation, and health) round out the projects.

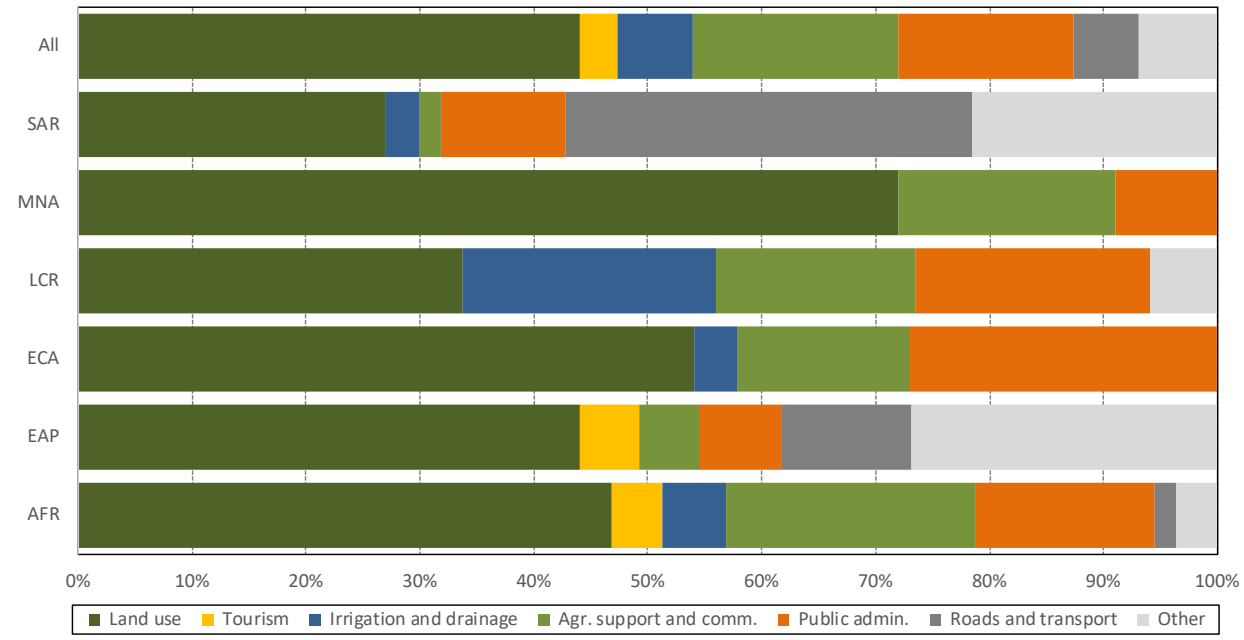


Figure 9: Distribution of activities in landscape approach projects
(% of commitments)

Figure 10 shows the distribution of land use activities in landscape approach projects, according to the level 2 sector coding in the Operations Portal. Overall, activities focusing on the broad 'other agriculture, fishing, and forestry' category account for about half of commitments to land use activities, with the share being particularly high in MNA, ECA, and EAP. Livestock-specific activities are important in AFR and to a lesser degree in LCR, while crop-specific activities are important in LCR and AFR. Forestry-specific activities are important in LCR and AFR, but if all activities that include forestry are considered, their share of commitments on land use activities rises to a third of the total, and is particularly high in MNA (72%), ECA (54%), and EAP (43%).

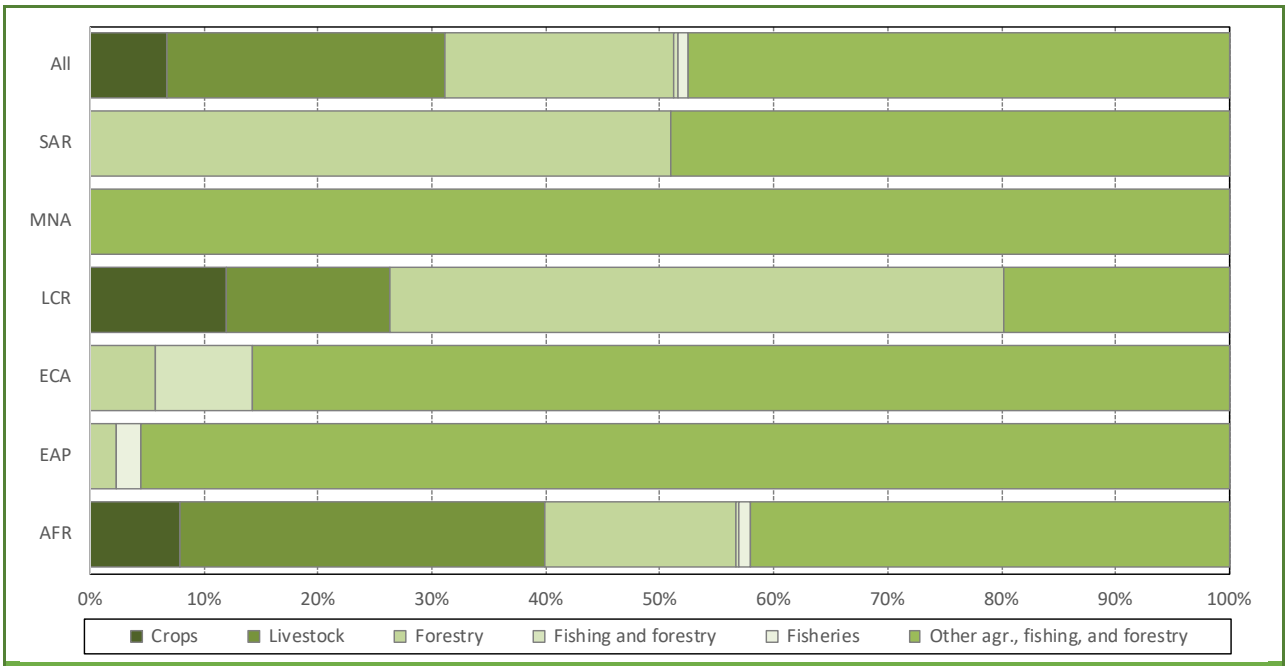


Figure 10: Distribution of land use activities in landscape approach projects
(% of commitments devoted to land use activities)

Participation

Some consider a participatory approach as being fundamental to landscape projects. Practically all projects in our sample adopt participatory approaches in their implementation, usually by leaving the choice of specific activities to be implemented to local communities or landholders. When land management plans are to be prepared, these too are usually prepared in a participatory manner. 84 percent of landscape projects used such approaches. These participatory approaches have also become quite common in many rural development and environmental projects, however, so it is not clear whether landscape projects are significantly different in this respect. Whether landscape project preparation has been participatory is less clear, mainly because most PADs provide relatively few details on how preparation was conducted. In some cases, participatory processes are explicitly mentioned, but explicit mentions probably understate their prevalence.

Use of NCA data in landscape projects

None of the landscape projects reviewed have explicitly used NCA data in their preparation. This is not surprising: efforts such as those supported by WAVES are relatively recent and are only recently starting to come to fruition in many countries. The results of WAVES estimates simply would not have been available in time to provide inputs. This is especially true for the earlier projects in our sample (for example, those approved in FY16) and for those that are AFs to even earlier projects. In Madagascar, for example, appraisal of the *Sustainable Landscape Management Project* (P154698/P157909) was completed just before the first draft of the country's WAVES estimates was ready for comment.

In this review, we examine what data projects actually used in their preparation and are using in implementation. Although this data was never NCA data per se, in some cases it was very similar to what an NCA exercise would have produced. We call such data 'NCA-like'. We also ask how NCA data could have helped improve projects had it been available.

Diagnosis

The first stage in any project development consists of identifying and diagnosing problems. To the extent that landscape approach projects use quantitative measures to do so, they are usually broad measures such as 'loss of forest area' or 'rate of deforestation'—often at the national level. These broad measures are then linked to others primarily in qualitative terms (e.g. 'deforestation causes increased erosion'). Reliance on such qualitative measures may make it difficult to convince Ministries of Finance to undertake a project at all or to allocate sufficient resources, thus leading to fewer projects, or to projects that are smaller than optimal.[13] NCA data could clearly provide a much clearer picture of problems, indicating how severe the consequences of ongoing trends are for the national economy.

Alternatively, in some cases ad hoc research is conducted to gather the necessary data. For example, a study was conducted of the cost of coastal degradation in several West African countries; it found that this cost was equivalent to over 5 percent of their GDP[14], thus helping make the case for the *West Africa Coastal Areas Management Program* (WACA). However, resources are not always available for such research, and there may not be sufficient time to conduct it. The availability of Natural Capital Accounts would enable such analyses to be conducted without having to rely on ad hoc research.

Beyond showing the importance of problems, NCA data could also help understand their causes. When an ecosystem or landscape provides many local benefits (for example, harvestable products), the incentives for local resource managers to conserve should be strong. If they do not, the ecosystem or landscape may be degraded because of factors such as open access problems or insecure tenure reducing these incentives, or because better management requires investments which are not feasible due to lack of expertise, capital, or specific inputs. A project would then address these problems. Conversely, if the bulk of benefits provided by an ecosystem or landscape are externalities from the perspective of local resource managers (for example, hydrological benefits, carbon sequestration), then local incentives to manage them sustainably are weak, and interventions such as payments for environmental services (PES) may be called for.

[13] This obviously is not an absolute bar as all the projects in our review were approved despite little or no economic valuation of the problems they were addressing. It is plausible to think, however, that there might have been projects approved (and so, more to review) if better evidence of the importance of landscapes had been available, or that more resources would have been allocated to landscape projects. As NCA estimates slowly become more widely available, it might be possible to test these hypotheses.

[14] Croitoru, L., J.J. Miranda, and M. Sarraf. 2019. "The cost of coastal zone degradation in West Africa: Benin, Côte d'Ivoire, Senegal, and Togo." West Africa Coastal Areas Management Program. Washington: World Bank.

Prioritization

While some landscape projects support broad reforms, most focus their efforts on select target areas, which immediately poses the problem of how to select these areas. Not all landscapes provide the same level of benefits. The extent and composition of benefits can vary substantially, depending on the characteristics of the landscapes, and on the characteristics and number of those who depend on their services. If projects can be targeted to the areas and activities that generate the greatest net benefits, or where failure to intervene would result in the largest net losses, project benefits can be maximized.

Landscape projects use a variety of criteria to select target areas. The *Burundi Landscape Restoration and Resilience Project* (P160613), for example, selected priority areas based on the following criteria:

> (a) most degraded land and high levels of soil erosion; (b) higher incidence of poverty; (c) greatest risk of floods and landslides; (d) greatest potential to protect downstream infrastructure (roads, houses, power, water supplies, and so on); (e) proximity to [protected areas]; (f) coverage by other ongoing projects; and (g) visibility for demonstration purposes (proximity to major highway).

Such criteria are a clear attempt to select areas of high value, but do so in an ad hoc way. Many of the criteria listed are only qualitative; where they are quantitative, they are incommensurate. Often, the procedure to use them is not much more sophisticated than listing the various possible project areas according to each criterion, and then picking those that score relatively high on most lists. In at least one case, however, a Multi-Criteria Analysis (MCA) was conducted.[15]

A project that focuses on watershed protection may use an indicator such as the number of downstream water users to identify and prioritize potential project areas. Where there are many different types of water uses, however, such simple indicators quickly break down. Should a watershed with many domestic water users and no hydroelectric power (HEP) production be prioritized over one that has fewer domestic water users but several HEP plants, or over one that has neither but has a large irrigated area? If watershed benefits can be valued, prioritization can be undertaken on a more consistent basis. NCA would provide a way to do such comparisons more systematically, using value as a common metric.

There is practically no within-area targeting in the current landscape projects (for example, to specific parts of a watershed).[16] This is an important limitation, as the extent to which particular parts of a landscape contribute to ES often varies substantially. NCA estimates that reflected this heterogeneity could allow a much greater degree of targeting, thus potentially increasing project effectiveness. For this to happen, however, NCA estimates would probably need to be undertaken at a much more fine-grain level than is currently done.

---

[15] In the *Brazil integrated Landscape Management in the Cerrado Biome Project* (P164602).

[16] The *Madagascar Sustainable Landscape Management Project* (P154698/P157909) targets broad sections of each watershed (upper, middle, lower), but within them does not specifically target, say, areas with steep slopes or in riparian corridors.

Because some details of implementation are often decided after project approval, there is still scope for NCA-like data to contribute to the within-area targeting in some cases. For example, on-going work in Vietnam to estimate the value of coastal ecosystems such as mangroves being undertaken under Targeted Technical Assistance (TTA) financed by the Global Program on Sustainability (GPS) is expected to help inform the implementation of the *Forest Sector Modernization and Coastal Resilience Enhancement Project* (FMCR) (P157127), including helping to select priority areas and determine how much of the available resources should be invested in each area. Moreover, several of the landscape projects reviewed (about a third, overall) are part of broad, long-term programs (see Figure 11). Thus, even if NCA-like data could not have contributed to the present projects, it might well contribute to future phases of these programs.

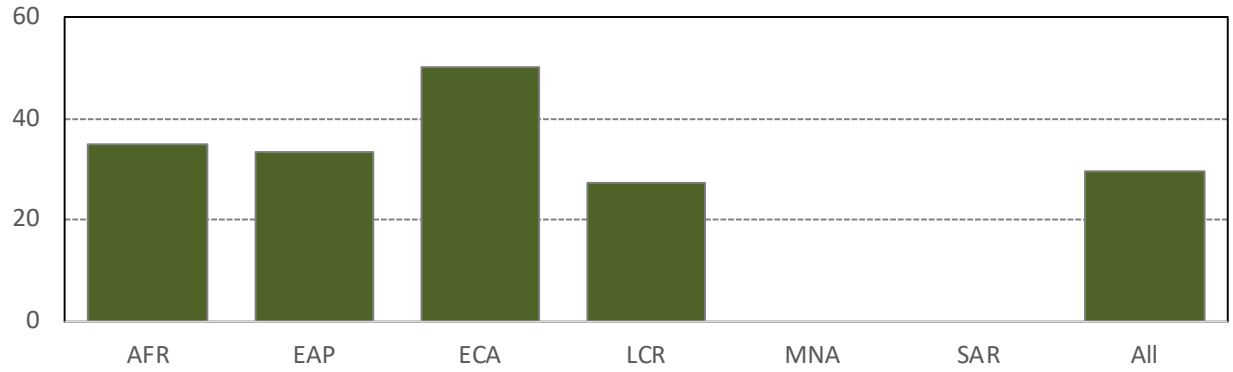


Figure 11: Extent to which landscape approach projects are part of long-term programs
(% of projects)

Design of appropriate responses

Many projects often base their choice of activities on technical considerations, and then assess whether their use brings net economic benefits. Often this assessment is conducted for the package of responses as a whole, without looking at its individual components. Landscape projects do not appear to be exceptions to this pattern. Landscape projects consider a broader range of activities than traditional projects (including, for example, both forest conservation in upper watersheds and improved irrigation in the lower watersheds), but still tend to consider each activity largely on its own merits. None of the landscape projects in our sample explicitly examined the potential tradeoffs between different land uses.

NCA data could help illuminate tradeoffs and inform discussions with stakeholders. Note that the natural capital accounts themselves do not necessarily show the tradeoffs directly. However, the process of constructing natural capital accounts often involves using models and other means to assess how natural resources affect ES. These models could be used to examine these tradeoffs.

Designing appropriate responses also means identifying who stands to gain or lose from current trends and from the possible solutions. Those who stand to lose if project activities affect them negatively may need to be compensated (such as upstream landholders who face land use restrictions aimed at protecting downstream water users), to secure their participation or avoid adverse social effects. Alternatively, project activities might be modified to reduce or eliminate such impacts. Conversely, those who stand to gain are likely to participate voluntarily and may

even be tapped as a funding source. The *Madagascar Sustainable Landscape Management Project* (P154698/P157909), for example, promotes upstream conservation to help improve the productivity of downstream irrigation; the user associations who stand to benefit from improved irrigation are expected to pay the long-term costs of upstream conservation activities. At present, analyses of potential winners and losers are often limited to the project's social assessment and economic analysis and, given the limitations of project preparation budgets, generally use whatever data is available and often rely heavily on benefits transfer. Even though many landscape management activities may affect a large number of people and groups through their effect on various ecosystem services, the analysis is often limited to the most direct beneficiaries (usually land users), as was seen in Figure 8 above, with other groups only considered in qualitative terms if at all.

NCA necessarily involves identifying those who benefit from ecosystem services and the magnitude of these benefits, as this information is required to construct the accounts. The availability of such accounts would thus enable a faster and more complete analysis of likely winners and losers.

Economic analysis

Almost all projects name land users as the main project beneficiaries, and there is almost always some measure of quantification of expected benefits they would receive from improved land uses (higher yields, lower costs, more valuable outputs). In some cases, this may include an estimate of the contribution of ES improvements to the improved benefits of land uses. The economic analysis of the *Madagascar Sustainable Landscape Management Project* (P154698/P157909), for example, attempts to incorporate the effect of watershed protection on returns to irrigation in the lower part of the watershed.

Other beneficiaries, if mentioned at all, are only mentioned in very general terms. One result of this is that the likely net benefits of landscape projects are almost certainly under-estimated. As already pointed out above, this underestimation is not necessarily fatal: all the projects in our sample were approved as they had shown sufficient benefits to justify their costs. (The *Mexico Forest Entrepreneurship Project* argued that even though measurable benefits were insufficient to justify the project by themselves, they were only a small part of total benefits and non-measured benefits did not need to be very large for total benefits to exceed costs.) If benefits had been better measured, however, likely showing much larger net benefits, a decision might have been made to undertake a larger project. Better measurement of benefits might also have resulted in changes in the mix of activities undertaken.

The main ES whose improvement is estimated is carbon sequestration. 45% of projects estimated carbon sequestration resulting from project activities, almost universally using the EX-ACT tool (Figure 12). A few projects also estimated improvements in hydrological services such as reduced sedimentation or improved dry season flow, either using models such as SWAT or InVEST or by relying on estimates in the literature.

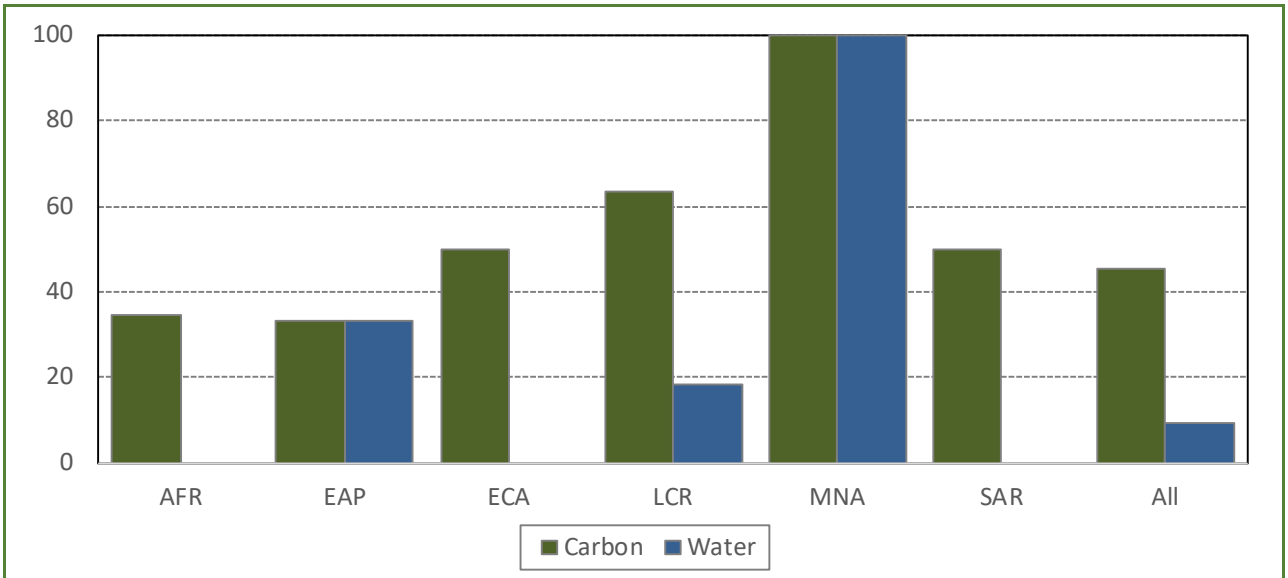


Figure 12: Ecosystem service improvement as an objective in landscape approach projects
(% of projects reviewed)

NCA data would allow for a much more comprehensive view of likely project benefits—both through the information contained in the accounts themselves and through the ability to use the tools and models used to construct the accounts to estimate the likely results of project interventions.

Monitoring of outcomes

Monitoring usually focuses on area brought under 'improved' or 'sustainable' land uses, or on the number of users of such practices. Even where improvements in land use benefits are an explicit project objective, they are not often included in the main indicators. Yields, for example, could fluctuate significantly due to weather conditions, making it difficult to attribute observed changes to project activities. Even in projects that explicitly target biodiversity improvement, the PDO indicator is usually along the lines of 'areas brought under enhanced biodiversity protection.'[17]

In a few cases, some projects are attempting to go further. The *China Zhejiang Qiandao Lake and Xin'an River Basin Water Resources and Ecological Environment Protection Project* (P159870), which used SWAT to identify priority areas for inclusion, is also planning to use this model to assess pollution reduction associated with land management interventions during the project period.

By systematically tracking changes in stocks and flows of a broad range of natural resources and ES, NCA could make it much easier to monitor the outcomes of landscape projects. That does not mean that the existence of accounts would solve all problems. First, for NCA data to be useful, it must be collected at the appropriate level of spatial disaggregation. Second, the problem of

[17] There are some individual exceptions. The *Mozambique Conservation Areas for Biodiversity and Development Phase 2 Project* (P166802), for example, has as explicit target of maintaining or increasing populations of certain key wildlife species.

attribution would remain—of distinguishing the effects of project activities from those of other factors, such as droughts. Here, too, it is likely that the data and models used to construct the accounts may prove of greater use than the accounts themselves.

Once it has been determined how NCA data can be used to track project outcomes, NCA also has the great advantage that it is not tied to project timelines. Many project outcomes may only be felt well after the project is completed; others may be observed during the project itself, but may not persist after the project ends. Yet whatever monitoring the project itself undertakes usually ceases entirely at project end. NCA processes, on the other hand, are intended to be ongoing, and so could continue to allow project outcomes to be tracked long after the project itself has ended.

Designing NCA to support landscape projects

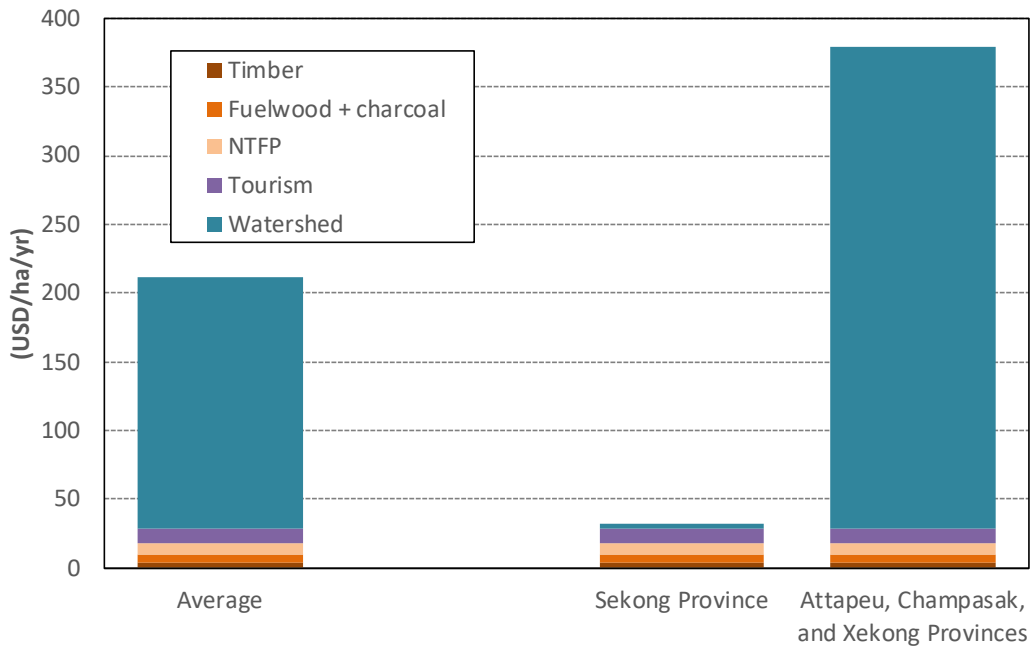
The preceding discussion makes it clear that NCA could be extremely useful to landscape projects at all stages, from the policy dialog that precedes the decision to undertake a project, to project design, through implementation, and even long after the project has ended. Yet the discussion had also highlighted that the mere existence of NCA might not be sufficient. NCA can be conducted in a number of ways and all may not be equally useful for different types of landscape projects.

An important question, therefore, is how NCA measurement efforts might be designed to be most useful to landscape projects. This is a question that will only be truly answered by experience, and which may, in fact, have many different answers depending on local conditions. Nevertheless, two aspects can already be identified as being important: that NCA needs to be conducted at an appropriate level of spatial disaggregation, and that the data and models used to construct the accounts may be as important if not more important than the accounts themselves.

Landscapes seldom match conveniently to administrative boundaries. Figure 13 illustrates the importance of undertaking NCA at a disaggregated level. The first column shows the damages of forest loss in Laos, from a study of the Cost of Environmental Degradation, an NCA-like exercise that focuses on damages from loss. On average, forests in Laos are said to generate USD183/ha/year—indeed, watershed protection is the largest component of forest value by far.[18] This average value, however, is based on an average of several studies from the region.[19] Two of these studies are, in fact, from Laos itself, and they show very different watershed protection values in different parts of the country, as can be seen in Figure 13. To be useful, NCA estimates must point out these differences, not obscure them within averages.

[18] Groby, M., and E. Strukova Golub. 2018. "Degradation of the Mekong Basin in Lao PDR: An Economic Analysis." Washington: World Bank.

[19] Emerton, L. 2013. *The Economic Value of Ecosystem Services in the Mekong Basin: What We Know, and What We Need To Know*. Gland: WWF.



Sources: Average from Groby and Strukova (2018); provincial values from Emerton (2013).

Figure 13: Estimated value of forests in Laos

In fact, the usefulness of NCA data for landscape projects would likely depend on the degree of spatial disaggregation. A national average could point out that certain ecosystems are more valuable than they appear in national accounts, and so bring attention to them. The average forest value for Laos in Figure 13 would indicate that protecting Laotian forests is important because of their value for watershed protection. Sub-national averages (for example, provinces or large watersheds) would also allow some degree of prioritization, by showing areas in which those ecosystems are more valuable than others. Thus, the province-specific data for Laos shows that forest conservation efforts should focus on Attapeu, Champasak, and Xekong Provinces rather than taking a broader approach. Sub-provincial data, or data based on natural units such as watersheds, would allow more fine-tuned targeting. Data that further distinguish different landscape elements (for example, different kinds of forests, pastures, crops) would be more useful still, as it would also allow project activities to be selected. Of course, undertaking NCA at a high degree of spatial disaggregation may not be feasible. If the accounts are intended to cover the entire country (or a large area), resource constraints could limit the extent of spatial detail. This restriction is less significant when the accounts are undertaken at a sub-national level, as in the Targeted Technical Assistance efforts that the GPS program is supporting.[20]

For initial diagnosis and problem identification, broad coverage of the country would be most helpful; for project design, detailed information on the target areas would be most helpful. There is thus a tension between the needs of these roles. A solution could be an initial broad analysis with deeper dives in some areas, which could not just provide data for those areas, but also

[20] For example, the TTA estimates are focuses on Khammuane Province in Laos and the Cardamom Mountains in Cambodia.

experience in identifying and measuring the ES flows so that they could be replicated more rapidly when projects require them.

Even if they are conducted at the appropriate level of spatial disaggregation, the accounts themselves will only provide part of the information needed for landscape projects. Natural Capital accounts tracks how natural resource stocks and flows change over time, and how their value evolves. This is already very useful in identifying problems and prioritizing them. Designing appropriate responses, however, requires an exploration of alternatives: what would happen if the landscape were modified in particular ways? Given that there are many possible ways in which landscapes might be modified, how do we determine which sets of changes would produce the most desirable sets of outcomes? Natural capital accounts would not ordinarily answer these questions, but the same data and models which are used to construct the accounts could be invaluable in helping to answer them.

The current TTA in Cambodia, for example, is seeking to assess the value of the Cardamom Mountains. An important component of this landscape's value is the contribution it makes to the hydrological services used by downstream irrigated agriculture and hydroelectric power production. A crude analysis that simply notes that the landscape in its current condition supplies a given flow of hydrological services, which in turn enable a certain amount of irrigation and hydroelectric power production is being undertaken with would not be very useful. Being able to distinguish the effect of different parts of the landscape would be much more useful: how much less services are being generated by degraded portions of the landscape compared to better conserved portions? Which portions of the landscape (spatially, qualitatively) are particularly important for the provision of hydrological services? Answering these questions requires a suitable hydrological model that can assess the relationship between upstream land use and downstream water flows. But this same model, once it has been constructed and validated, will also allow many more questions to be answered—How would hydrological flows change, for example, if degraded areas were restored? Which degraded areas would be particularly important to restore? This type of model would also allow potential landscape-level interventions to be assessed.

Leveraging landscape projects to improve NCA

Landscape projects could, in turn, support future NCA work by carrying out targeted monitoring and research. Projects that are part of long-term programs lend themselves particularly to this as they could collect data over a long time period.

- Monitoring flows of ecosystem services from given landscapes, prior to and during project implementation (and, ideally, also after the end of the project).
- Undertaking targeted research to better understand ecosystem flows. This could take the form of measuring flows in test parcels with and without project interventions or monitoring hydrological flows from paired catchments, for example.[21]

[21] For example, the *Colombia Mainstreaming Sustainable Cattle Ranching Project* (P104687) undertook extensive research on the linkages between biodiversity and the silvopastoral practices it supported. (This project is not in our sample as it was approved in FY11.)

Many projects already invest in improved monitoring: 21 of our sample of landscape approach projects did so (48%). However, this monitoring is generally targeted at simply observing ecosystem flows, not at attributing them to project activities or to different landscape elements. Only 8 projects (18%) include efforts to undertake an impact evaluation; all but one of these are in Africa, and one is in LCR.

The *China Zhejiang Qiandao Lake and Xin'an River Basin Water Resources and Ecological Environment Protection Project* (P159870), which used SWAT to identify priority areas for inclusion, is planning to undertake a water quality survey whose data will serve to evaluate the assumptions underlying the SWAT model.