Rural Valuation Tool
Field Manual

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Indufor North America, the Foundation for Ecological Security, and Ulster University

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Contents

1. Introduction

Billions of people live in rural areas and rely on natural resources for their livelihoods. While such lands and resources provide people with incomes, shelter, food, and cultural value, there is little understanding of the economic value of these resource flows within a community or by other stakeholders, particularly in emerging markets.[1] The dearth of information on such resource flows leaves rural households vulnerable to speculation, inadequate compensation in the case of expropriation, and, perhaps, missed opportunities to benefit from their natural capital. When faced with outside interest in their lands or resources, people find themselves ill equipped to defend their land, or negotiate and demand fair compensation for their land. At the same time, companies and governments create risks to themselves by underestimating the value of community assets.[2] This is increasingly a concern as commercial investment in land and natural resources grows.[3]

Equipping individual households, communities, the investment community, and governments with a tool to ascertain an economic value on the range of assets (tangible and intangible) owned, held and used by rural residents might help reduce information asymmetry and empower residents to negotiate from a stronger position thereby reducing conflicts and improving investment outcomes. Unfortunately, existing valuation methods for commercial use of land and forests do not consider the full range of values generated by rural assets and other intangible assets important to rural livelihoods.[4] Common valuation methods such as replacement cost, the income approach, or comparable sales provide a framework to apply to rural assets with some modification for particular resources and legal customs in place.

Through funding from the Omidyar Network, Indufor partnered with the Foundation for Ecological Security (FES) and Ulster University to develop a rural valuation tool (RVT) for use by households, communities, the investment community, and government. The tool is intended to fill the information gap and better inform all stakeholders of the estimated value of rural lands and natural resources, particularly in environments where there is little data on comparable land sales. The tool integrates market and nonmarket methods to produce primarily quantitative data, captures both social capital and natural capital in diverse settings, and balances rigor with efficiency. Indufor developed an Excel version of the valuation tool, as well as an Android-compatible mobile application of the tool for easier in-field entry.

Drawing on principles of natural capital accounting, social capital accounting and real property rights, the valuation model considers a broad range of benefits generated by both communally-held and private property. One of the unique contributions of this initiative is to synthesize evidence of the role that different property rights and levels of social capital have on the ability of stakeholders to use and manage natural resources and ecosystem services over time. Future phases of this initiative may seek to automate certain aspects of data capture and analysis to facilitate a more efficient and cost effective way of estimating the value of community assets, for example using a variation on computer-assisted mass appraisal.

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[1] Knight, Rachael. 2015. Balancing The Numbers: Using Grassroots Land Valuation To Empower Communities In Land Investment Negotiations. Presented to World Bank Land and Poverty Conference 2015. Washington DC.
[2] Munden Project. 2014. Communities as Counterparties. http://www.rightsandresources.org/wp-content/uploads/Communities-as-Counterparties-FINAL_Oct-21.pdf
[3] World Bank. 2011. Rising Global Interest In Farmland. Washington DC. http://siteresources.worldbank.org/DEC/Resources/Rising-Global-Interest-in-Farmland.pdf
[4] See for example: International Valuation Standards Council. 2013. The Valuation of Forests. Exposure Draft. http://www.ivsc.org/sites/default/files/Forestry%20TIP%20Exposure%20Draft.pdf

Field manual objectives

This manual provides an introduction to the theoretical foundation behind the survey design, as well as practical guidance on how users may use the valuation tool. Users can include various stakeholders associated with rural land, including individual households and other types of private landholders, communities, and facilitators working with these stakeholders.

2. Valuation scope and principles

This section provides an overview of the scope of land use activities covered by the tool, and accounting principles used in the valuation process. Users of the tool should first read this guidance in order to assess whether the tool will be useful for their purposes, and to ensure that valuations generated from using the tool follow some common standardized guidelines.

Who can use this tool?

The tool can be used by a local community or jurisdiction to value a communally managed parcel, or by individuals, households, or organizations to value privately held land.

The language in this manual defaults to cases where the tool is used to value communally-managed land since this is typically a complex scenario requiring guided facilitation. However, for the questions in the tool that would be need to be framed differently to assess the value of private landholdings, some examples are given as to how to adapt the tool for these arrangements. In some cases, a village or other rural jurisdiction may feature a mix of communally-managed land and privately-held land. In that case, the tool could be used in different iterations to generate valuations across both types of land, to provide a more comprehensive picture of the value of the land across the entire jurisdiction.

Ideally, a facilitator from a locally active NGO or community-based organization who is trained in the tool should help guide community members through the valuation exercise. Facilitators with previous experience conducting socioeconomic surveys and/or rapid rural appraisals will have an easier time. Those with access to Android tablets can use the app-based version of the RVT, but it is also possible to conduct the surveys on paper first and input later into the app or in an Excel-based version of the tool on a computer. However, in the absence of professional facilitators, the tool is designed to be sufficiently accessible so that representatives of local governments, village committee members, or even individuals within a community can directly use the tool, assuming a basic foundation of technical knowledge and resources, such as access to Android-based smartphones and laptops, and the ability to reference the field guide.

Any data collected through the bottom-up survey process should be validated through other primary or secondary sources, such as review by additional community stakeholders, and other survey efforts or technical studies.

Defining community

In the case that the land parcel is used by many households or groups, they would constitute the 'community' that derives value from the parcel. A community is therefore defined here as all households using a parcel, potentially encompassing one or more villages, habitations (cluster of houses), or other social units. Distinct groups within the community would ideally be surveyed individually, to ensure mutually exclusive and collectively exhaustive results.

Example: Defining and surveying the community

Mukungarh, a village in Bhilwara District, Rajasthan, consists of three habitations that form social units within the village. Together, these habitations collectively manage two grazing plots. When using the tool, each grazing plot was considered its own land parcel, with the community consisting of all three habitations for each case. When piloting the tool, the survey team held a meeting in each habitation to fill out the survey, going through questions for both grazing plots. People in one habitation were asked to also estimate totals across the whole village. Habitation-specific estimates were then totaled or averaged and compared against the village-wide estimates, for validation.

Some villages feature a mix of communally-managed land used for silvopasture, along with privately held land used for agriculture. The tool could be used to value both types of land. For each land parcel, a separate valuation would be conducted.

Ideally, the valuation should be conducted by facilitators using a standardized approach across all land parcels in order to ensure consistency and comparability.

Community-centric approach

Many natural resource management activities are enabled through government grants. Any revenues from these activities are cancelled out by corresponding costs incurred by government. Other costs incurred by government may or may not be cancelled out by corresponding benefits.

The tool is based upon a community-centric valuation approach, taking the standpoint of people living on the land, excluding costs incurred by or benefits accrued to outsiders, for example by a forestry department who pays for a forest guard.

Social capital

For each land use activity on the parcel, the user of the tool will fill out a 14-question social capital survey. Together, the answers to the survey questions reflect a community's ability to sustainably manage and benefit from natural resources on a specific parcel. Social capital in this context is defined by core indicators in the following categories:[5]

- Breadth of land tenure rights
- Legality of land tenure rights
- Security of land tenure rights
- Presence of institutions and rules
- Inclusivity and fairness
- Robustness of institutions

Land tenure rights captured in the above include:

- Right to access and use the parcel
- Right to benefit from the parcel
- Right to control how the parcel will be used

[5] The full set of survey questions can be found in the Conducting Surveys section starting on p. 15.

- Right to exclude others from unauthorized use of the parcel
- Right to pass rights to the parcel down to future generations or sell rights to others

Answers to the survey questions are aggregated into a weighted-sum social capital score of 0-20, 20 being the highest score corresponding to the highest level of social capital. The weight of each social capital category is predetermined, ranging from 15% to 20%. The overall score is displayed on the final Valuation Certificate in the Android app, as well as the final valuation results in the Excel-based version of the model.

In terms of how the social capital score influences the actual valuation, each possible score on the scale of 0 to 20 corresponds to an alphanumeric rating (Aaa – Ca) adapted from Moody's risk assessment ratings criteria. The rating in turn links to an estimated discount rate spread (0% – 12%), which incorporates risk premiums for both sovereign risk and social capital risk. More details on the underlying theory are available in *Appendix A: Theoretical Foundation*.

Natural capital

Land use activities

The tool is designed so that valuation is applied to a land parcel that may have one or more land uses that provide specific resource or benefit flows. The following types of land use and resource/benefit flows are currently able to be valued through the tool:

Land use activity	Resource or benefit flow
Forestry	Timber
	Non-timber forest products
Agriculture	Crops
Grazing	Fodder
Mining	Minerals, stone, and clay
Other	Other resource or benefit flows without standardized sections in the tool, e.g. other products/ecosystems not captured above
General (can apply to multiple categories)	Water provision
	Spiritual/cultural/recreational value
	Buildings

Common examples of mixed land-use scenarios that could be valued include:

- Land that is managed using a silvopasture regime, valued through a mix of land use types above including forestry and grazing.
- Land that has spiritual value associated with a working-land forest, valued through accounting for non-timber forest product production and spiritual value
- Land that has a sacred site on it, valued through accounting for the spiritual value of the site in addition to the value of the other natural or physical capital
- Land that is used for grazing and features an earthen pond or other water body, valued through accounting for fodder and water provision

While the tool is generally focused on valuing natural capital, it is also possible to roughly account for the value of built capital on the parcel, for example for housing, temples, or other facilities. If the property does not have a clear market price, construction cost can be used as a proxy, adjusted for depreciation.

The current Android-based version of the tool is limited to accounting for benefits and costs from forestry, agriculture, grazing, and mining. For users interested in accounting for other benefits and costs, it is recommended to use the Excel-based model which provides users the flexibility to adapt the model to suit additional activities. Suggested methods, not currently supported by the Android-based version of the tool, are provided in the implementation guide to cover water provision, spiritual/cultural/recreational value, and real estate value. Aquaculture and fishing are not yet covered. Non-fodder products that can be harvested from grasslands or other non-forest ecosystems can also be entered in the custom Excel spreadsheet.

Valuation of intangible forms of natural capital associated with carbon, biodiversity, and watershed services run into data gaps related to market pricing and quantification of natural capital supply itself, therefore incompatible with the current rapid survey approach which relies on quick and imprecise estimates. There are currently no survey questions specifically available in the tool's survey to handle these services.

However, if users can separately calculate the value of such intangible services (see Box X for examples), they are still able to integrate them into the tool's Excel-based valuation model.

Complementary approaches to valuing ecosystem services

Carbon: To account for the value of carbon sequestration, a user can use an income-based approach assuming some change in management or change in threat level that would result in additional carbon benefits. This should be done with an NGO or project developer with carbon expertise. It is recommended that users value carbon sequestration based on what is additional and monetizable through carbon finance. Some value carbon sequestration based on total forest stocks rather than figuring out a baseline against which to estimate carbon sequestration that would not have occurred under business as usual. However, this overstates and misleads about the actual marketable value of land.

Carbon quantification methodologies are available from independent third-party standards such as the Verified Carbon Standard to measure and project net carbon sequestration (and emissions) levels around sustainable forest and agricultural land use activities. Using an income approach, carbon revenues can be valued by multiplying an average offset market price against the total verified and/or projected tonnes of carbon dioxide equivalent sequestered over a project period in a set geographic boundary. Income can be netted out by considering project development, certification, and any transaction costs.

Watershed services: Beyond the direct flows of water provision that can be valued through avoided cost, other watershed services such as erosion control, enhanced soil quality, increase in total water yield, stabilization of streamflow distribution, and control of sediment in streams are harder to value accurately, particularly using a rapid survey approach. For example, valuation of indirect benefits of improved land management such as increased crop yields due to enhanced water flows relies on a technical understanding of hydrological flows in order to accurately attribute the relationship between the managed parcel and other parcels. It is therefore incompatible with the current rapid survey approach. A more technical hydrological assessment could be done. Limited benchmarking could be done against existing watershed investment programs, e.g. what people are willing to pay for water rights via local user fees, though generally pricing for payment for watershed services (PWS) schemes is more variable and over-the-counter compared to carbon given its localized nature.

Biodiversity: Valuing biodiversity is a complex matter and can encompass both instrumental and intrinsic values. For instrumental values such as crop pollination, an avoided cost approach could be used, however, risks double-counting the value of crops. Income approaches could be used in the presence of ecotourism. More broadly, contingent valuation has been the most often used method for valuing biodiversity, given the inability of other valuation methods to gauge passive or nonuse values of biodiversity. Contingent valuation has major limitations and given its limitations to recognize the entire range of biodiversity benefits, provides at most a lower bound to the value of biodiversity changes.

Historical and projected data

In order to value the parcel, the user of the tool needs to enter in data from previous years on benefits and costs of different natural capital flows or built capital. The user of the tool can enter in as little as one year of historical data on benefits and costs associated with a land parcel. However, the projections will be better if more historical data is available. Two or three years are recommended as the minimum number of years of data needed for the valuation to be useful. For areas that experience greater variation in benefits and costs over the year, it is important to note whether the data collected represents peaks or troughs in a cycle, or as part of a more consistent upward, downward, or flat trend.

The years available for data collection can be discontinuous. For example, if data for specific years is not available, the survey team may also ask in terms of a "good year" or "bad year" (e.g. good years marked by moderate rainfall, and bad years marked by droughts or excessive rainfall), or "before management" and "after management" if a major change to the natural resource management regime has been made, for instance if harvest rules were made more restrictive or a new yield-boosting practice were introduced.

The tablet-based version of the tool will by default calculate the average of historical data entered, to project that going forward, but provides an option for users to overrule those projections if they have more realistic estimates to share. For example, if a particular revenue stream is likely to continue to decrease or be phased out altogether, the user can adjust the inputs accordingly.

Beyond historical data on existing land use activities to be projected forward, households or a community may have new activities or investments in mind. They can therefore also input assumptions about future costs and potential benefits associated with investment decisions. The tablet-based version of the survey currently includes a module where the user can input assumptions about future costs but not benefits, requiring a workaround (see Appendix B for details). If users want to use the tool for decision-making around future investments, they can also use the Excel-based version which has the flexibility to accommodate data on both new future costs and benefits. It would not be necessary to enter types of costs that are already reflected in historical data. Those will automatically be projected forward.

Direct vs. end products

Accounting for fodder, fuelwood, or water individually as direct products rather than accounting for end products is easier in terms of data availability and quality. This is particularly the case given limited community or other grassroots capacity to account for all end products. In addition, the tool is focused on how much value is derived by the land itself rather than other inputs for value-added end products.

Users of the tool should account for benefits and costs associated with raw, unprocessed direct products rather than value-ended end products (e.g. livestock-based products such as milk and wool, value of non-sale animals in terms of useful life of livestock as annual flows).

Flows vs. stocks

Net benefits captured in the valuation are falling in cases where an increasing number of households in a community diversify their livelihoods to include off-farm sources such as non-agricultural activities or remittances, even if overall land productivity remains high or increases.

Users of the tool and valuation results therefore need to understand and communicate that the valuation only reflects benefit/cost flows based on the community's actual past use. Unless the community is fully optimizing use of the parcel, the valuation does not capture the ideal or potential use of full stocks available on the parcel.

Harvest cycles and annual vs. perennial species

When collecting harvest data on annual and perennial species, it is necessary to ask about the harvest cycle – whether it is annual or once every few years. They should take care to ask about multiyear harvest cycles rather than take averages across a couple years' worth of convenient data. In a case where forest thinning for many years is punctuated by the occasional selective harvest, it would be important to be able to project that anticipated major harvest, even if the community is only able to provide data on a couple of years with forest thinning activities. If the community has been managing the area long enough on a rotation, they should be able to provide more information.

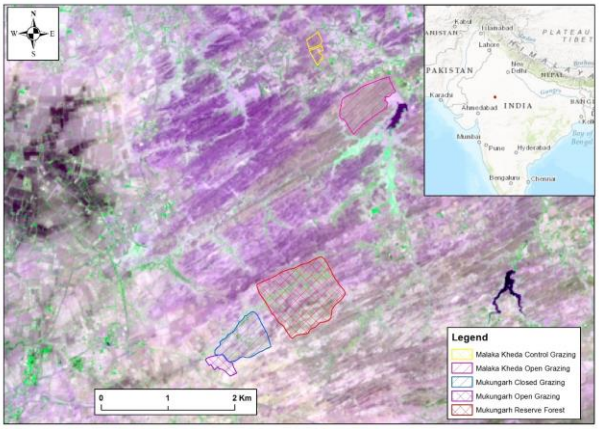
For perennial species, bottom-up estimates of the quantity of consumption cannot be used as proxies for biophysical productivity. Perennial species typically have longer-term harvest cycles, where the extent to which stocks are left standing between years affects growth rates and productivity.

This is an issue in both grassland and forest ecosystems wherever fuelwood or other products are collected from perennial species. However, it is clearly much more problematic for forest ecosystems and perennial grasslands compared to annual grasslands. Granted, some selective accounting may be easier in forest ecosystems, depending on the system of harvest. For instance, in the case of the Veelva forest, the community cuts and carries the fodder from the forest, whereas for the commons used by Mukungarh and Mala ka Khera, fodder is grazed onsite by livestock. Cut-and-carry systems allow for simpler estimates of how much fodder is consumed from the forest compared to grazing-based production systems.

Scaling up valuation

Adjustments and refined sampling techniques are needed to ensure that bottom-up valuations can be used to infer the value of other similar landscapes with similar land uses, crucial to feed into any efforts to scale up valuation, for example through a computer-assisted mass appraisal (CAMA) approach.

The question of how to supplement the income approach with a productivity-based approach using GIS/remote-sensing sources will be explored in the future. For now, the valuation results produced by the tool only cover projections based on the way people are currently and plan to use a land parcel, rather than based on the highest-and-best use of the land.



Satellite imagery of villages in Bhilwara, Rajasthan / Summer 2017

Labor cost

In many rural areas, labor related to natural resource management or extraction does not yield a formal wage. Farmers, for example, may not be paid an actual wage per hour or day worked that is additional to the value they derive from selling or using the products they harvest. In such cases, the value of their time may be approximated using an opportunity cost approach. For example, daily opportunity cost may be estimated by dividing average household income by the average number of working-age adults per household. When possible, it helps to ask for the average number of hours spent on each unpaid activity rather than applying the full daily rate. Average household income will differ from region to region, and in some cases will be lower than an established minimum wage rate.

In situations where children or elders are also contributing labor but would not be considered eligible for formal wage-earning opportunities, there is still an opportunity cost to consider. For instance,

children may be foregoing school or extracurricular activities to be running errands in the field. The tool does not prescribe a standardized approach on calculating the opportunity cost here, but rather encourages users to determine how to treat this on a case-by-case basis depending on specific circumstances.

3. User engagement

A few steps are needed before a household or community can use the tool to value a land parcel.

Within a local jurisdiction:

1. People interested in using the tool can identify local facilitators from a local land governance body/committee, NGO, or other relevant body with local legitimacy to help lead scoping of the tool. The facilitators ideally have a preexisting relationship with people from all major groups using the land, not just selective ones, which could bias representation toward one set of users over another. The facilitators should have a comprehensive grasp of the Rural Valuation Tool and its questions from reviewing this field manual and have experience with field methods such as focus groups, key informant interviews, and household level surveys.
2. The facilitators should convene a meeting with key decision-makers and residents in the community, with equitable representation and participation across gender, ethnicity/caste, socioeconomic class, age, literacy, and leadership levels, following principles of Free, Prior, and Informed Consent (FPIC). The community or village head(s) should be first consulted in person to approve the meeting, with local residents notified ahead of time. Upon introducing the tool, it is essential that facilitators listen to various stakeholders' insights on motivations to use (or reject) the tool.
3. Identify the key pieces of land in a local area that produce value for the community at large or individual households
4. Check for any existing valuations or benchmarks of value for those pieces of land, for example by going to websites that provide listings on land for sale in that area. Existing prices for land may not adequately reflect the real value or use of the land, and could be higher or lower than the valuation derived through this tool.
5. Identify existing records for other land and resource-related data collection and management. Especially useful would be census numbers, harvest and resource use/sales data, and spatial data that could populate a base map on land use, quality, and productivity. Examples of useful spatial data include those on the following:
    - administrative divisions
    - maps of customary and community-managed lands
    - hydrological maps
    - digital elevation models
    - forest cover
    - wasteland maps
    - agro-ecological zones
    - bio-geographic zones
    - protected areas
    - biomass or Normalized Difference Vegetation Index (NDVI)

6. Narrow down land parcels that will be valued using the tool, based on local interest, data gaps, and time availability.
7. Prepare a work plan that clearly identifies facilitators and other key team members who will be involved in the surveying efforts, and a timeline with dates that work for people in the community to participate in focus groups and any other key informant or household level interviews.

Survey team members from the Foundation for Ecological Security reference a community resource map in Mukungarh, Rajasthan / August 2017.

Resource map for Mala ka Khera, Rajasthan / August 2017.

Community engagement best practices

- A strong NGO partner or locals well versed in land use and natural resource management are crucial, particularly those that have already cultivated trust and have an existing record of working with the community or individuals who intend to value the land using the tool.
- If a land parcel is used by multiple groups, e.g. habitations or villages, the facilitators and survey team will get more accurate results if able to survey each group separately and then compare against estimated totals across all groups, to ensure mutually exclusive and collectively exhaustive results. Mutually exclusive means that there is no double-counting, and collectively exhaustive means that the results capture all major uses by all groups.
- Facilitators should adapt survey questions to fit local language(s) and cultural context(s). Translating or adapting the tool into several languages and for different cultural contexts may be required within the same community.

Community meeting in Richwara, Rajasthan / October 2017

Voluntary meetings

In the pilot effort in India, meetings were held for 1-2 hours over the course of 1-2 days per village or habitation. No payment was provided, in order to encourage voluntary participation. The survey efforts were integrated into the existing framework of village committee meetings, with members signing off on any decisions in a community resolution book. At a results-sharing session, food and entertainment were provided, locally driven and organized.

  - Facilitators may want to ask questions a few different ways and more than once to different participants in order to verify the most effective method, particularly when deriving quantitative estimates of specific benefits and costs.
  - Facilitators may use user-friendly visual anchors (e.g. community timeline, resource map) and follow-up math tables to help answer difficult valuation questions. These types of visual aids can help guide community answers based on specific, commonly agreed-upon points in time, e.g. good/bad year, before/after management
- Focus group sessions are best held at a time of day and meeting location that is convenient for a diverse representation of people in the community, e.g. not held during the time of day when specific groups may not be present such as during market days, or hours of peak agricultural work. Equitable representation and participation across gender, ethnicity/caste, socioeconomic class, age, literacy, and leadership levels is crucial to ensuring equitable engagement and to ensure that data are representative of all perspectives.
- The survey process and use of the tool by communities should be consensual without compulsion, and adapted to local interests and culture. Sessions can be framed as knowledge-sharing opportunities. Facilitators should be proactive about sharing results after data collection and valuation process are completed. Although sometimes payment has sometimes been provided to communities for their time or transportation costs, it is generally preferable to have people attend on their own voluntary volition. Exceptions may be made in areas where people cannot afford to take the time off to attend the session. Sessions should be located on or near the parcel itself in order to avoid or minimize travel time. In general, offering locally appropriate refreshments (tea, soda, coffee, water and snacks) is a good practice. If sessions span a longer time or coincides with meal times, a full meal could be provided.
- Facilitators should try to achieve an ‘active listening’ balance during survey efforts that guides the discussion but does not dominate the discussion at the expense of community participation. Facilitators should also keep close note of group dynamics and try to ensure that more dominant personalities don’t monopolize the discussion. Individual follow-ups may be necessary with people who did not express themselves in the group settings.

For each relevant land parcel:

1. Gain understanding of local context
    a. Define all major user groups of the land parcel. This could span anywhere from one household to several households; habitations; villages; or towns.
    b. Create or find a community map of the target land parcel and others used by the community
    c. Gather information on any existing local land valuation methods (official and customary), e.g. from the local tax authority or real estate market records, collect any relevant data for benchmarking
    d. Record community-perceived resource base and drivers of value on the land, both tangible and intangible, market and nonmarket, with an eye to how they have shifted historically over time. Validate assumptions regarding drivers of value.
    e. Record commonly agreed upon rules for land use and management, with eye to how they have shifted over time
    f. Identify types and sources of data for natural and social capital relevant to the tool, including both primary and secondary sources as needed, indicating any quality concerns or other gaps
2. Prepare for surveying efforts
    a. Determine when members from the community are available to participate in the survey. The social capital survey should take one hour to deploy, and the natural capital survey two to three hours for one or two land parcels. Time requirements will vary depending on the capacity of participants and the complexity of the land use. This can be split into a few hour-long sessions over the course of a few days if necessary.
    b. Allocate a few days among core facilitators and participants to calculate, process, and validate some of the survey answers.
    c. Determine which version of the tool to use. Data for the tool can be collected using paper surveys or RVT, the Android-based version of the tool, which will be released for free use on the Indufor website and on Github, along with a user guide to the app. An excel version of the tool is also available.
3. Use the tool (details in following section)
4. Share the results
    a. Hold a session with households or members of the community to share initial valuation results and seek feedback and validation of results, as well as discuss implications of the valuation going forward

For a more comprehensive guide to community-based facilitation on land and natural resource management, see Namati's Community Land Protection Facilitators Guide.

4. Conducting surveys

Survey design and time/data requirements

The survey is designed to be deployed over the course of a couple of hours per major user of a parcel. For example, if a land parcel is used primarily by one individual or one group of stakeholders, the survey likely only needs to be conducted once. However, if the land parcel is used by diverse individuals or groups, the survey may need to be conducted once each for each stakeholder group, to ensure collectively exhaustive,

mutually exclusive results. The survey is similar in nature to socioeconomic surveys and other surveys that have been designed for rapid rural assessments.

The survey is designed to yield a valuation that can be disaggregated by different natural resources and activities, as well as assess the tenure security or statutory use rights than may vary across these resources.

- Paper surveys
- Android app
- Excel model

Data collected through the bottom-up survey process can ideally be validated through other primary or secondary sources.

The survey is broken down into the following components:

- Basics
- Social capital (for each land use activity)
- Natural capital (for each land use activity)

Planning and training the team

When being used to value a land parcel used by multiple stakeholders, the tool requires strong and inclusive stakeholder participation, with guided facilitation by NGO or agency staff with prior experience in stakeholder consultations and/or enumerator experience collecting data on land, resource, and governance issues in rural settings. Two facilitators per meeting are helpful for working with larger groups, as they allow for more flexibility in conversation flow, and verification of information. When possible, it helps to have a dedicated note taker. For smaller groups, one facilitator may be sufficient.

The logistical constraints imposed by this design necessitate tradeoffs in terms of the level of detail that can be obtained and the accuracy of valuation figures. However, this initial proposed tool should be viewed as a prototype to be further refined and potentially expanded. For now, the tool can be used to produce valuations that indicate the general magnitude of net benefits that local stakeholders derive from a land parcel. Validation using more technical assessments is needed for at least initial benchmarking to ensure that bottom-up results are within a reasonable margin of error.

The next section provides guidance on how to walk through the survey questions and associated calculations step by step, applicable to both paper and electronic forms. Appendix I provides a walk through the survey questions in the Android app form, with the question on the left and corresponding guidance on the right. Appendix II provides printable copies of the survey if the surveyor wants to use paper copies in the field. Appendix III provides an overview of the Excel model.

Implementation

This section walks users through how to answer the survey questions underlying the valuation, one question at a time. Next to each survey item, the following icons help indicate any special data collection considerations:

● = Requires onsite data collection
O = Involves offsite and/or secondary data collection
☠ = May be challenging to answer or require follow-up math
V = Should be closely validated if possible (guidance provided on potential methods for validation)

Basics

To save time, the facilitator should fill out some of this section prior to meeting with the households or community seeking to value the land parcel.

Survey item	Guidance
Date O	Current date
Respondent group O	Unique identifier for respondent group, for example, if there are 2+ groups or social units being interviewed about one land parcel
Surveyor name O	Name of the primary facilitator or notetaker
Community name O	Name of the community. If an individual is filling it out, fill in "N/A"
District O	Location of the land parcel
State O	
Country O	
Language O	Currently, only English and Hindi versions of the survey are available.
Currency O	Indicate appropriate currency. All of the monetary values in the survey should be entered assuming use of this currency.
Sovereign risk rate O	It is recommended to use the average sovereign/country risk rate from the most recent year. You can use the 10-year bond rate using www.tradingeconomics.com/bonds; use the price in the second column that corresponds with the country of interest.
Inflation rate O	It is recommended to use the average inflation rate from the most recent year. Country-level inflation rates are available at www.tradingeconomics.com/forecast/inflation-rate. If possible, use a more accurate inflation rate from the state/provincial level, or for rural areas, by checking a country's office of statistics.
Number of survey participants ●	Depending on the size of the group, this could take a significant amount of time. This process can be time-consuming if there are many participants. In some cases with limited time, it may make more sense to initially write down the names of participants and then follow up with them to fill in other details after the survey efforts itself.
Name (for each participant) ●	
Occupation (for each participant) ●	
Gender (for each participant) ●	
Age (for each participant) ●	
Years of education completed (for each participant) ●	
What are the major land use activities or resource flows on your land? ●	Options: forestry, agriculture, grazing, mining
What are the GPS coordinates of the parcel? ●	Major GPS coordinates can be derived for the parcel using the app-based version of the valuation tool or a standalone GPS device.
Parcel area (hectares) ● V	A rough estimate can be used initially here based on local knowledge. However, for validation, a more precise calculation of can be done if the parcel is mapped on a GIS layer with the ability to automatically calculate parcel area.

Social capital

Survey item	Guidance
What rights do households in this community have over the	If the parcel is managed as private rather than common land, adjust the question by substituting "this community" with "the individual/household/organization."

parcel specific to this land use activity? ●	
What rights to the parcel specific to this land use activity are provided through a state-backed and legally recognized record (i.e. title, lease, etc.)? ●	
Are the boundaries for the land use activity on this parcel well known and understood by government authorities and/or community members? ●	
Does this group feel confident that they will be able to continue to use the parcel for this land use activity without constraints indefinitely into the future?●	If the parcel is managed as private rather than common land, adjust the question by substituting "this group" with "the individual/household/organization."
Are there any current disputes related to the boundaries or rights associated with this parcel related to this land use activity? ●	
Do households in this community use the parcel for this land use activity based on locally recognized customary norms? ●	If the parcel is managed as private rather than common land, adjust the question by substituting "households in this community" with "the individual/household/organization."
Is there a group or committee in this community with specific responsibility to manage or oversee matters related to use of this land use activity on the parcel? ●	If the parcel is managed as private rather than common land, adjust the question by substituting "households in this community" with "the individual/household/organization." If the parcel is managed as private rather than common land, check "Yes" by default.
Are there rules and regulations associated with this land use activity on the parcel that were created by the community itself? ●	If the parcel is managed as private rather than common land, adjust the question by substituting "community" with "individual/household/organization"
Do all stakeholders within the community generally have equal access to the parcel for this land use activity? ●	If the parcel is managed as private rather than common land, adjust the question by substituting "within the community" with "within the household/organization" if dealing with a household or organization. If dealing with a single individual, check "Yes" by default.
Does the management group include representatives from all segments of the community? ●	If the parcel is managed as private rather than common land, adjust the question by substituting "all segments of the community" with "all members of the household/all key divisions of the organization" if dealing with a household or organization. If dealing with a single individual, check "Yes" by default.

Are the rules and regulations associated with this land use activity on the parcel generally viewed as fair and legitimate by the community? ●	If the parcel is managed as private rather than common land, adjust the question by substituting "households in this community" with "the individual/household/organization."
How long have the institutions associated with this specific land use activity on this parcel been operating? ●	If the parcel is managed as private rather than common land, adjust the question with, "How long has the current owner been using this parcel for this specific land use activity?"

Natural capital

Below are comprehensive guides for questions related to:

- Forestry
- Agriculture
- Grazing
- Mining

These correspond to the Android app and paper-based formats of the tool.

Guidance is also provided for:

- Water provision
- Spiritual/cultural/recreational value
- Real estate

While the survey does not have questions specific to these benefit types, users can custom-enter data on them in the more flexible Excel-based version of the tool.

Forestry	
Survey item	**Guidance**
What timber do you harvest, if any? ●	List all of the names of major timber species harvested from the parcel. This includes not only timber that is sold on the market but also timber harvested for household use. Confirm that the timber reported is harvested from the target parcel and not from other parcels.
What non-timber forest products (e.g. fuelwood, fodder, food, medicine) do you harvest, if any? ●	Add names of key non-timber forest products harvested from the parcel, one at a time. This includes not only products that are sold on the market but also those that are harvested for household use. Confirm that the NTFPs reported is harvested from the target parcel and not from other parcels.
Enter the years for which you have data on harvest activities: ●	Indicate the years for which you have data on harvest activities for the products you listed earlier. The years need not be consecutive. For example, if you only have data for 2011 and 2016, that is fine. Although it is possible to enter only one year of data, accuracy of projections would be significantly compromised. At the very least try to enter data for two years representing a good year and bad year, or the situation before and after management in the case that a new resource management regime was introduced.

	If specific years are difficult to recall, facilitators may use user-friendly visual anchors (e.g. community timeline). These types of visual aid can help anchor answers to specific, commonly agreed-upon points in time, e.g. good/bad year, before/after management.
Enter harvest estimates for all major products, for the years listed. ● ○ ☠ V *How often do you harvest x?* *Number of households that harvest x:* *Quantity of x harvested each time:* *Price of x per unit:* *% area harvested:*	Designate harvest frequency. If there was a major harvest of a product such as timber (e.g. major clear-cut) that is unlikely to be repeated, note "one-time" as the time period. In the app, if the frequency is less than once per year, enter the appropriate fraction of a year. For instance, if maintenance is carried out only once every two years, select "per year" and enter "0.5." For greater precision, enter directly into the self-filling version of the Excel spreadsheet where it is possible to put in the precise values in specific years rather than a fraction each year. If harvest data is reported per household, enter the number of households, and enter the quantity of product harvested *per household*. If harvest data is reported as a total across all households, enter "1" for the number of households, and enter the total quantity harvested across all households. Verify that people are reporting harvest volume/weight and price based on the same units. Verify that people are only reporting harvest volume based on the specific parcel. If people generally only recall total harvest volume across multiple land parcels, ask them to estimate the percentage of the total volume they derive from the land parcel in question. For respondents who prefer to visualize percentages, the facilitator could draw a pie chart representing all harvest volume across land parcels, and ask how large a slice should be attributed to each land parcel. In the case that the land parcel is used by many people and people have differing answers, try to obtain an average from the discussion. The % area harvested is optional, intended to give an indication of how much of the total harvest stock is harvested each time – only a rough proxy because it does not consider intensity of harvest. For example, 100% of an area could be harvested for timber but only be thinned rather than clear-cut.
Calculate the average of historical data for each item. The valuation will project cash flows for the next 15 years. Does the average seem realistic to use for this projection? If not, please enter a more realistic estimate. ● ○ ☠ V	The valuation will by default take an average of the data you entered for each particular product across all years. In some cases, the average may not be realistic. For example, the user may be aware of a downward or upward trend into the future that is not captured by simply taking an average. In such a case, select "No" and provide more realistic assumptions to be projected across the next 15 years.
What types of costs do you incur on the parcel specific to forestry? ●	Add names of key costs incurred on the parcel specific to forestry. Do not include costs associated with other activities or resource flows, there will be a section at the end where it is possible to input any more general shared costs incurred on the parcel that are not unique to forestry.
Enter the years for which you have cost data: ●	Indicate years for which you have data. The years need not be consecutive. For example, if you only have data for 2011 and 2016, that is fine. Although it is possible to enter only one year of data, accuracy of projections would be significantly compromised. At the very least try to enter data for two years representing a good year and bad year, or the situation before and after management in the case that a new resource management regime was introduced. If specific years are difficult to recall, facilitators may use user-friendly visual anchors (e.g. community timeline). These types of visual aid can help anchor answers to

	specific, commonly agreed-upon points in time, e.g. good/bad year, before/after management.
Enter estimates for all major costs, for the years listed. ● O ☠ V *How often do you incur cost x?* *Number of households that incur cost x:* *Quantity of x cost incurred each time:* *Cost of x per unit:*	Designate cost frequency. If there was a major one-time cost that is unlikely be repeated, select "one-time" as the time period. If the frequency is less than once per year, enter the appropriate fraction of a year. For instance, if maintenance is carried out only once every two years, select "per year" and enter "0.5." For greater precision, enter directly into the self-filling version of the Excel spreadsheet where it is possible to put in the precise values in specific years rather than a fraction each year. If cost data is reported per household, enter the number of households, and enter the cost incurred *per household*. If cost data is reported as a total across all households, enter "1" for the number of households, and enter the total cost incurred across all households. Verify that people are reporting cost and price based on the same units.
Calculate the average of historical data for each item. The valuation will project cash flows for the next 15 years. Does the average seem realistic to use for this projection? If not, please enter a more realistic estimate. ● O ☠ V	The RVT app will by default take an average of the data you entered for each particular cost across all years. In some cases, the average may not be realistic. For example, the user may be aware of a downward or upward trend into the future that is not captured by simply taking an average. In such a case, select "No" and provide more realistic assumptions to be projected across the next 15 years.
Do you plan on incurring any new future costs (and associated benefits) on the parcel specific to forestry, separate from those already entered for the past? What types? ●	Discussion of future investments can be time-consuming and require its own standalone hour-long session, and can be combined with a broader discussion of community vision and decision-making. Add names of key additional future costs to be incurred on the parcel specific to forestry, for example, investment in certain harvesting equipment. For new types of future benefits (e.g. a new type of non-timber forest product), in the app-based version of the tool, the user will need to enter it in the earlier section on harvested products, insert 0 across all items in historical data, then override the assumptions in the projections section to include projected benefits going forward. Users can also use the Excel-based version to explore scenarios for future investments, as the Excel model has more flexibility relative to the app to accommodate data on both new future costs and benefits. Do not enter any existing costs that were already entered as part of historical data. Those will automatically be projected forward.
Enter estimates for future costs (and benefits) ● O ☠ V *In what year do you expect to begin incurring cost x?* *How often will you incur cost x?* *Quantity of x cost incurred each time:*	A page will be populated for each future cost listed, for each year listed. Indicate the year in which the cost will first be incurred. It cannot be a previous year. The amount can currently only be reported as a total, rather than per household. If it is a recurring new future cost, enter the same cost for the relevant years. There is no way to indicate frequency for future costs in the current App-based version. The amount is assumed to be in the same currency as originally entered when signing up.

Cost of x per unit:

Agriculture	
Survey item	**Guidance**
What crops do you harvest, if any? ●	List all of the names of major crops harvested from the parcel. This includes not only crops sold on the market but also crops harvested for household use. Confirm that the crops are harvested from the target parcel and not from other parcels.
Enter the years for which you have data on harvest activities: ●	Indicate the years for which you have data on harvest activities for the products you listed earlier. The years need not be consecutive. For example, if you only have data for 2011 and 2016, that is fine. Although it is possible to enter only one year of data, accuracy of projections would be significantly compromised. At the very least try to enter data for two years representing a good year and bad year, or the situation before and after management in the case that a new resource management regime was introduced. If specific years are difficult to recall, facilitators may use user-friendly visual anchors (e.g. community timeline). These types of visual aid can help anchor answers to specific, commonly agreed-upon points in time, e.g. good/bad year, before/after management.
Enter harvest estimates for all major products, for the years listed. ● O ☠ V *How often do you harvest x?* *Number of households that harvest x:* *Quantity of x harvested each time:* *Price of x per unit:* *% area harvested:*	Designate harvest frequency. In the app, if the frequency is less than once per year, enter the appropriate fraction of a year. For instance, if maintenance is carried out only once every two years, select "per year" and enter "0.5." For greater precision, enter directly into the self-filling version of the Excel spreadsheet where it is possible to put in the precise values in specific years rather than a fraction each year. If harvest data is reported per household, enter the number of households, and enter the quantity of product harvested *per household*. If harvest data is reported as a total across all households, enter "1" for the number of households, and enter the total quantity harvested across all households. Verify that people are reporting harvest volume/weight and price based on the same units. Verify that people are only reporting harvest volume based on the specific parcel. If people generally only recall total harvest volume across multiple land parcels, ask them to estimate the percentage of the total volume they derive from the land parcel in question. For respondents who prefer to visualize percentages, the facilitator could draw a pie chart representing all harvest volume across land parcels, and ask how large a slice should be attributed to each land parcel. In the case that the land parcel is used by many people and people have differing answers, try to obtain an average from the discussion. The % area harvested is optional, intended to give an indication of how much of the total harvest stock is harvested each time – only a rough proxy because it does not consider intensity of harvest.
Calculate the average of historical data for each item.	The valuation will by default take an average of the data you entered for each particular product across all years. In some cases, the average may not be realistic. For example, the user may be aware of a downward or upward trend into the future

The valuation will project cash flows for the next 15 years. Does the average seem realistic to use for this projection? If not, please enter a more realistic estimate. ● O ☠ V	that is not captured by simply taking an average. In such a case, select "No" and provide more realistic assumptions to be projected across the next 15 years.
What types of costs do you incur on the parcel specific to agriculture? ●	Add names of key costs incurred on the parcel specific to agriculture. Do not include costs associated with other activities or resource flows, there will be a section at the end where it is possible to input any more general shared costs incurred on the parcel that are not unique to agriculture.
Enter the years for which you have cost data: ●	Indicate years for which you have cost data. The years need not be consecutive. For example, if you only have data for 2011 and 2016, that is fine. Although it is possible to enter only one year of data, accuracy of projections would be significantly compromised. At the very least try to enter data for two years representing a good year and bad year, or the situation before and after management in the case that a new resource management regime was introduced. If specific years are difficult to recall, facilitators may use user-friendly visual anchors (e.g. community timeline). These types of visual aid can help anchor answers to specific, commonly agreed-upon points in time, e.g. good/bad year, before/after management.
Enter estimates for all major costs, for the years listed. ● O ☠ V *How often do you incur cost x?* *Number of households that incur cost x:* *Quantity of x cost incurred each time:* *Cost of x per unit:*	Designate cost frequency. If there was a major one-time cost that is unlikely be repeated, select "one-time" as the time period. If the frequency is less than once per year, enter the appropriate fraction of a year. For instance, if maintenance is carried out only once every two years, select "per year" and enter "0.5." For greater precision, enter directly into the self-filling version of the Excel spreadsheet where it is possible to put in the precise values in specific years rather than a fraction each year. If cost data is reported per household, enter the number of households, and enter the cost incurred *per household*. If cost data is reported as a total across all households, enter "1" for the number of households, and enter the total cost incurred across all households. Verify that people are reporting cost and price based on the same units.
Calculate the average of historical data for each item. The valuation will project cash flows for the next 15 years. Does the average seem realistic to use for this projection? If not, please enter a more realistic estimate. ● O ☠ V	The app will by default take an average of the data you entered for each particular cost across all years. In some cases, the average may not be realistic. For example, the user may be aware of a downward or upward trend into the future that is not captured by simply taking an average. In such a case, select "No" and provide more realistic assumptions to be projected across the next 15 years.
Do you plan on incurring any new future costs (and associated benefits) on the parcel specific to agriculture, separate from those already	Discussion of future investments can be time-consuming and require its own standalone hour-long session, and can be combined with a broader discussion of community vision and decision-making. Add names of key additional future costs to be incurred on the parcel specific to agriculture, for example, investment in certain harvesting equipment.

entered for the past? What types? ●	For new types of future benefits (e.g. a new type of crop), in the app-based version of the tool, the user will need to enter it in the earlier section on harvested products, insert 0 across all items in historical data, then override the assumptions in the projections section to include projected benefits going forward. Users can also use the Excel-based version to explore scenarios for future investments, as the Excel model has more flexibility relative to the app to accommodate data on both new future costs and benefits. Do not enter any existing costs that were already entered as part of historical data. Those will automatically be projected forward.
Enter estimates for future costs (and benefits) ● O ☠ V *In what year do you expect to begin incurring cost x?* *How often will you incur cost x?* *Quantity of x cost incurred each time:* *Cost of x per unit:*	A page will be populated for each future cost listed, for each year listed. Indicate the year in which the cost will first be incurred. It cannot be a previous year. The amount can currently only be reported as a total, rather than per household. If it is a recurring new future cost, enter the same cost for the relevant years. There is no way to indicate frequency for future costs in the current App-based version. The amount is assumed to be in the same currency as originally entered when signing up.

Grazing	
Survey item	**Guidance**
What livestock do you raise, if any? ●	Add all of the names of major livestock that graze on the parcel.
Enter the years for which you have data on livestock activity: ●	Use the dropdown to indicate the number of years for which you have data on consumption of fodder for the livestock types you listed earlier. The years need not be consecutive. For example, if you only have data for 2011 and 2016, that is fine. Although it is possible to enter only one year of data, accuracy of projections would be significantly compromised. At the very least try to enter data for two years representing a good year and bad year, or the situation before and after management in the case that a new resource management regime was introduced. If specific years are difficult to recall, facilitators may use user-friendly visual anchors (e.g. community timeline). These types of visual aid can help anchor answers to specific, commonly agreed-upon points in time, e.g. good/bad year, before/after management.
Enter grazing period and fodder estimates for all major livestock types, for the years listed. ● O ☠ V	Indicate the average number of months a year that each livestock type spends grazing on the land. In the app, if the grazing frequency is less than one month or once per year, enter the appropriate fraction of a year. For instance, if grazing happens only one month every two years, select "0.5." For greater precision, enter directly into the self-filling version of the Excel spreadsheet where it is possible to put in the precise values in specific years rather than a fraction each year. If grazing data is reported per household, multiply the number of households by the average number of livestock per household.

	Verify that people are reporting harvest volume/weight of fodder and price of fodder based on the same units. Verify that people are only reporting fodder consumption based on the specific parcel. If people generally only recall total fodder consumption across multiple land parcels, ask them to estimate the percentage of reliance their livestock have on the land parcel in question. For respondents who prefer to visualize percentages, the facilitator could draw a pie chart representing all fodder consumption across land parcels, and ask how large a slice should be attributed to each land parcel. In the case that the land parcel is used by many people and people have differing answers, try to obtain an average from the discussion. Community or household level estimates of fodder consumption should, if possible, be validated using a biomass survey, which can serve as an upper limit.
Calculate the average of historical data for each item. The valuation will project cash flows for the next 15 years. Does the average seem realistic to use for this projection? If not, please enter a more realistic estimate. ● O ☠ V	The valuation will by default take an average of the data you entered for each particular product across all years. In some cases, the average may not be realistic. For example, the user may be aware of a downward or upward trend into the future that is not captured by simply taking an average. In such a case, select "No" and provide more realistic assumptions to be projected across the next 15 years.
What types of costs do you incur on the parcel specific to grazing? ●	Add names of key costs incurred on the parcel specific to grazing. Do not include costs associated with other activities or resource flows, there will be a section at the end where it is possible to input any more general shared costs incurred on the parcel that are not unique to grazing.
Enter the years for which you have cost data: ●	Indicate years for which you have cost data. The years need not be consecutive. For example, if you only have data for 2011 and 2016, that is fine. Although it is possible to enter only one year of data, accuracy of projections would be significantly compromised. At the very least try to enter data for two years representing a good year and bad year, or the situation before and after management in the case that a new resource management regime was introduced. If specific years are difficult to recall, facilitators may use user-friendly visual anchors (e.g. community timeline). These types of visual aid can help anchor answers to specific, commonly agreed-upon points in time, e.g. good/bad year, before/after management.
Enter estimates for all major costs, for the years listed. ● O ☠ V *How often do you incur cost x?* *Number of households that incur cost x:* *Quantity of x cost incurred each time:*	Designate cost frequency. If there was a major one-time cost that is unlikely be repeated, select "one-time" as the time period. If the frequency is less than once per year, enter the appropriate fraction of a year. For instance, if maintenance is carried out only once every two years, select "per year" and enter "0.5." For greater precision, enter directly into the self-filling version of the Excel spreadsheet where it is possible to put in the precise values in specific years rather than a fraction each year. If cost data is reported per household, enter the number of households, and enter the cost incurred *per household*. If cost data is reported as a total across all households, enter "1" for the number of households, and enter the total cost incurred across all households.

Cost of x per unit:	Verify that people are reporting cost and price based on the same units.
Calculate the average of historical data for each item. The valuation will project cash flows for the next 15 years. Does the average seem realistic to use for this projection? If not, please enter a more realistic estimate. ● O ☠ V	The app will by default take an average of the data you entered for each particular cost across all years. In some cases, the average may not be realistic. For example, the user may be aware of a downward or upward trend into the future that is not captured by simply taking an average. In such a case, select "No" and provide more realistic assumptions to be projected across the next 15 years.
Do you plan on incurring any new future costs (and associated benefits) on the parcel specific to agriculture, separate from those already entered for the past? What types? ●	Discussion of future investments can be time-consuming and require its own standalone hour-long session, and can be combined with a broader discussion of community vision and decision-making. Add names of key additional future costs to be incurred on the parcel specific to agriculture, for example, investment in certain harvesting equipment. For new types of future benefits (e.g. a new type of crop), in the app-based version of the tool, the user will need to enter it in the earlier section on harvested products, insert 0 across all items in historical data, then override the assumptions in the projections section to include projected benefits going forward. Users can also use the Excel-based version to explore scenarios for future investments, as the Excel model has more flexibility relative to the app to accommodate data on both new future costs and benefits. Do not enter any existing costs that were already entered as part of historical data. Those will automatically be projected forward.
Enter estimates for future costs (and benefits) ● O ☠ V *In what year do you expect to begin incurring cost x?* *How often will you incur cost x?* *Quantity of x cost incurred each time:* *Cost of x per unit:*	A page will be populated for each future cost listed, for each year listed. Indicate the year in which the cost will first be incurred. It cannot be a previous year. The amount can currently only be reported as a total, rather than per household. If it is a recurring new future cost, enter the same cost for the relevant years. There is no way to indicate frequency for future costs in the current App-based version. The amount is assumed to be in the same currency as originally entered when signing up.

Mining	
Survey item	**Guidance**
What do you extract, if anything? ●	Add all of the names of minerals mined from the parcel. This includes not only minerals sold on the market but also those extracted for household use.
Enter the years for which you have data on mining activities: ●	Use the dropdown to indicate the number of years for which you have data on mining activities for the minerals you listed earlier. The years need not be consecutive. For example, if you only have data for 2011 and 2016, that is fine.

	Although it is possible to enter only one year of data, accuracy of projections would be significantly compromised. At the very least try to enter data for two years representing a good year and bad year, or the situation before and after management in the case that a new resource management regime was introduced. If specific years are difficult to recall, facilitators may use user-friendly visual anchors (e.g. community timeline). These types of visual aid can help anchor answers to specific, commonly agreed-upon points in time, e.g. good/bad year, before/after management.
Enter mining frequency and extraction estimates for all major livestock types, for the years listed. ● O ☠ V *How often do you extract x?* *Number of households that extract x:* *Quantity of x extracted each time:* *Price of x per unit:* *% area extracted:*	Designate harvest frequency. In the app, if the frequency is less than once per year, enter the appropriate fraction of a year. For instance, if maintenance is carried out only once every two years, select "per year" and enter "0.5." For greater precision, enter directly into the self-filling version of the Excel spreadsheet where it is possible to put in the precise values in specific years rather than a fraction each year. If harvest data is reported per household, enter the number of households, and enter the quantity of product harvested *per household*. If harvest data is reported as a total across all households, enter "1" for the number of households, and enter the total quantity harvested across all households. Verify that people are reporting harvest volume/weight and price based on the same units. Verify that people are only reporting harvest volume based on the specific parcel. If people generally only recall total harvest volume across multiple land parcels, ask them to estimate the percentage of the total volume they derive from the land parcel in question. For respondents who prefer to visualize percentages, the facilitator could draw a pie chart representing all harvest volume across land parcels, and ask how large a slice should be attributed to each land parcel. In the case that the land parcel is used by many people and people have differing answers, try to obtain an average from the discussion. The % area harvested is optional, intended to give an indication of how much of the total harvest stock is harvested each time – only a rough proxy because it does not consider intensity of harvest.
Calculate the average of historical data for each item. The valuation will project cash flows for the next 15 years. Does the average seem realistic to use for this projection? If not, please enter a more realistic estimate. ● O ☠ V	The valuation will by default take an average of the data you entered for each particular product across all years. In some cases, the average may not be realistic. For example, the user may be aware of a downward or upward trend into the future that is not captured by simply taking an average. In such a case, select "No" and provide more realistic assumptions to be projected across the next 15 years.
What types of costs do you incur on the parcel specific to mining? ●	Add names of key costs incurred on the parcel specific to mining. Do not include costs associated with other activities or resource flows, there will be a section at the end where it is possible to input any more general shared costs incurred on the parcel that are not unique to mining.
Enter the years for which you have cost data: ●	Indicate years for which you have cost data. The years need not be consecutive. For example, if you only have data for 2011 and 2016, that is fine. Although it is possible to enter only one year of data, accuracy of projections would be significantly compromised. At the very least try to enter data for two years representing a good year and bad year, or the situation before and after management in the case that a new resource management regime was introduced.

	If specific years are difficult to recall, facilitators may use user-friendly visual anchors (e.g. community timeline). These types of visual aid can help anchor answers to specific, commonly agreed-upon points in time, e.g. good/bad year, before/after management.
Enter estimates for all major costs, for the years listed. ● O ☠ V *How often do you incur cost x?* *Number of households that incur cost x:* *Quantity of x cost incurred each time:* *Cost of x per unit:*	Designate cost frequency. If there was a major one-time cost that is unlikely be repeated, select "one-time" as the time period. If the frequency is less than once per year, enter the appropriate fraction of a year. For instance, if maintenance is carried out only once every two years, select "per year" and enter "0.5." For greater precision, enter directly into the self-filling version of the Excel spreadsheet where it is possible to put in the precise values in specific years rather than a fraction each year. If cost data is reported per household, enter the number of households, and enter the cost incurred *per household*. If cost data is reported as a total across all households, enter "1" for the number of households, and enter the total cost incurred across all households. Verify that people are reporting cost and price based on the same units.
Calculate the average of historical data for each item. The valuation will project cash flows for the next 15 years. Does the average seem realistic to use for this projection? If not, please enter a more realistic estimate. ● O ☠ V	The app will by default take an average of the data you entered for each particular cost across all years. In some cases, the average may not be realistic. For example, the user may be aware of a downward or upward trend into the future that is not captured by simply taking an average. In such a case, select "No" and provide more realistic assumptions to be projected across the next 15 years.
Do you plan on incurring any new future costs (and associated benefits) on the parcel specific to mining, separate from those already entered for the past? What types? ●	Discussion of future investments can be time-consuming and require its own standalone hour-long session, and can be combined with a broader discussion of community vision and decision-making. Add names of key additional future costs to be incurred on the parcel specific to mining, for example, investment in certain excavation equipment. For new types of future benefits (e.g. a new type of mineral), in the app-based version of the tool, the user will need to enter it in the earlier section on harvested products, insert 0 across all items in historical data, then override the assumptions in the projections section to include projected benefits going forward. Users can also use the Excel-based version to explore scenarios for future investments, as the Excel model has more flexibility relative to the app to accommodate data on both new future costs and benefits. Do not enter any existing costs that were already entered as part of historical data. Those will automatically be projected forward.
Enter estimates for future costs (and benefits) ● O ☠ V *In what year do you expect to begin incurring cost x?* *How often will you incur cost x?*	A page will be populated for each future cost listed, for each year listed. Indicate the year in which the cost will first be incurred. It cannot be a previous year. The amount can currently only be reported as a total, rather than per household. If it is a recurring new future cost, enter the same cost for the relevant years. There is no way to indicate frequency for future costs in the current App-based version. The amount is assumed to be in the same currency as originally entered when signing up.

Quantity of x cost incurred each time: *Cost of x per unit:*

This section covers costs incurred across the whole parcel that are shared across land use activities or resource flows.

Shared costs	
Survey item	**Guidance**
What types of shared costs do you incur on this parcel? ●	Add any costs that are incurred on the parcel across all types of activities. For example, labor for patrol or fencing that helps with general maintenance that is not associated with a single land use activity would go here.
Enter the years for which you have cost data: ●	Indicate years for which you have data. The years need not be consecutive. For example, if you only have data for 2011 and 2016, that is fine. Although it is possible to enter only one year of data, accuracy of projections would be significantly compromised. At the very least try to enter data for two years representing a good year and bad year, or the situation before and after management in the case that a new resource management regime was introduced.
Enter estimates for all major costs, for the years listed. ● ○ ☠ V *How often do you incur cost x?* *Number of households that incur cost x:* *Quantity of x cost incurred each time:* *Cost of x per unit:*	A page will be populated for each cost listed, for each year listed. Designate cost frequency. If there was a major one-time cost that is unlikely be repeated, select "one-time" as the time period. If the frequency is less than once per year, enter the appropriate fraction of a year. For instance, if maintenance is carried out only once every two years, select "per year" and enter "0.5." For greater precision, enter directly into the self-filling version of the Excel spreadsheet where it is possible to put in the precise values in specific years rather than a fraction each year. If cost data is reported per household, enter the number of households, and enter the cost incurred *per household*. If cost data is reported as a total across all households, enter "1" for the number of households, and enter the total cost incurred across all households. The price unit is assumed to be in the same currency as originally entered when signing up.
Calculate the average of historical data for each item. The valuation will project cash flows for the next 15 years. Does the average seem realistic to use for this projection? If not, please enter a more realistic estimate. ● ○ ☠ V	The RVT app will by default take an average of the data you entered for each particular cost across all years. In some cases, the average may not be realistic. For example, the user may be aware of a downward or upward trend into the future that is not captured by simply taking an average. In such a case, select "No" and provide more realistic assumptions to be projected across the next 15 years.
Do you plan on incurring any new future shared costs (and associated benefits) on the parcel, separate from those already entered for the past? What types? ●	Discussion of future investments can be time-consuming and require its own standalone hour-long session, and can be combined with a broader discussion of community vision and decision-making. Add names of key additional future costs to be incurred on the parcel specific to forestry, for example, investment in certain harvesting equipment. For new types of future benefits (e.g. a new type of non-timber forest product), in the app-based version of the tool, the user will need to enter it in the earlier section

	on harvested products, insert 0 across all items in historical data, then override the assumptions in the projections section to include projected benefits going forward. Users can also use the Excel-based version to explore scenarios for future investments, as the Excel model has more flexibility relative to the app to accommodate data on both new future costs and benefits. Do not enter any existing costs that were already entered as part of historical data. Those will automatically be projected forward
Enter estimates for future costs (and benefits) ● O ☠ V *In what year do you expect to begin incurring cost x?* *How often will you incur cost x?* *Quantity of x cost incurred each time:* *Cost of x per unit:*	A page will be populated for each future cost listed, for each year listed. Indicate the year in which the cost will first be incurred. It cannot be a previous year. The amount can currently only be reported as a total, rather than per household. If it is a recurring new future cost, enter the same cost for the relevant years. There is no way to indicate frequency for future costs in the current App-based version. The amount is assumed to be in the same currency as originally entered when signing up.

Water provision	
This suggested method only values direct water use—used onsite or withdrawn, based on an avoided-cost approach. Valuation of water is not currently supported in the App-based version of the tool, but can be directly entered into the Excel-based version of the tool.	
Survey item	**Guidance**
What water bodies are located on the land parcel? ●	List all of the names of key water bodies being used on the parcel. Confirm that the water body is on the target parcel and not on an adjacent parcel.
How is the water body used? ●	Uses could include: • Domestic household use • Communal use (onsite or withdrawn)
Example: livestock consumption (adapt as needed to other scenarios, using an avoided-cost approach)	
What livestock do you raise, if any? ●	Add all of the names of major livestock that drink from the water body.
Enter the years for which you have data on livestock activity: ●	Use the dropdown to indicate the number of years for which you have data on consumption of fodder for the livestock types you listed earlier. The years need not be consecutive. For example, if you only have data for 2011 and 2016, that is fine. Although it is possible to enter only one year of data, accuracy of projections would be significantly compromised. At the very least try to enter data for two years representing a good year and bad year, or the situation before and after management in the case that a new resource management regime was introduced. If specific years are difficult to recall, facilitators may use user-friendly visual anchors (e.g. community timeline). These types of visual aid can help anchor answers to specific, commonly agreed-upon points in time, e.g. good/bad year, before/after management.

Enter drinking period and water consumption estimates for all major livestock types, for the years listed. ● O ☠ V *How many days (or months) per year do livestock drink water from this water body?* ● *Water consumption levels per day (by livestock type)* ● O ☠ V *Price of water (approximating closest substitute by water quality type and use)* O	Indicate the average number of months a year that each livestock type spends grazing on the land. If grazing data is reported per household, multiply the number of households by the average number of livestock per household. Verify that people are reporting harvest volume/weight of fodder and price of fodder based on the same units. Verify that people are only reporting fodder consumption based on the specific parcel. If people generally only recall total fodder consumption across multiple land parcels, ask them to estimate the percentage of reliance their livestock have on the land parcel in question. For respondents who prefer to visualize percentages, the facilitator could draw a pie chart representing all fodder consumption across land parcels, and ask how large a slice should be attributed to each land parcel. In the case that the land parcel is used by many people and people have differing answers, try to obtain an average from the discussion. Community or household level estimates of water consumption should, if possible, be validated using a calculation of water carrying capacity, which can serve as an upper limit. Water carrying capacity can be estimated by collecting information on depth, width, and height, as well as information on how much water is supplied (including recharge) of that volume each month of the year. Respondents should be careful not only to report the actual volume of water in the water body, since this also depends on the level of withdrawal.
Calculate the average of historical data for each item. The valuation will project cash flows for the next 15 years. Does the average seem realistic to use for this projection? If not, please enter a more realistic estimate. ● O ☠ V	The valuation will by default take an average of the data you entered for each particular product across all years. In some cases, the average may not be realistic. For example, the user may be aware of a downward or upward trend into the future that is not captured by simply taking an average. In such a case, enter more realistic assumptions to be projected across the next 15 years.
What types of costs do you incur on the parcel specific to the water body? ●	Add names of key costs incurred on the parcel specific to maintaining or enhancing the water body. Do not include costs associated with other activities or resource flows, there will be a section at the end where it is possible to input any more general shared costs incurred on the parcel that are not unique to the water body.
Enter the years for which you have cost data: ●	Indicate years for which you have cost data. The years need not be consecutive. For example, if you only have data for 2011 and 2016, that is fine. Although it is possible to enter only one year of data, accuracy of projections would be significantly compromised. At the very least try to enter data for two years representing a good year and bad year, or the situation before and after management in the case that a new resource management regime was introduced. If specific years are difficult to recall, facilitators may use user-friendly visual anchors (e.g. community timeline). These types of visual aid can help anchor answers to specific, commonly agreed-upon points in time, e.g. good/bad year, before/after management.
Enter estimates for all major costs, for the years listed. ● O ☠ V	Designate cost frequency. If there was a major one-time cost that is unlikely be repeated, select "one-time" as the time period. If cost data is reported per household, enter the number of households, and enter the cost incurred *per household*. If cost data is reported as a total across all

	households, enter "1" for the number of households, and enter the total cost incurred across all households. Verify that people are reporting cost and price based on the same units.
Calculate the average of historical data for each item. The valuation will project cash flows for the next 15 years. Does the average seem realistic to use for this projection? If not, please enter a more realistic estimate. ● O ☠ V	The valuation will by default take an average of the data you entered for each particular cost across all years. In some cases, the average may not be realistic. For example, the user may be aware of a downward or upward trend into the future that is not captured by simply taking an average. In such a case, enter more realistic assumptions to be projected across the next 15 years.
Do you plan on incurring any new future costs (and associated benefits) on the parcel specific to agriculture, separate from those already entered for the past? What types? ●	Discussion of future investments can be time-consuming and require its own standalone hour-long session, and can be combined with a broader discussion of community vision and decision-making. Add names of key additional future costs to be incurred on the parcel specific to the water body, for example, installing a filtration system or water pump. Users can use the Excel-based version to explore scenarios for future investments. Do not enter any existing costs or benefits that were already entered as part of historical data. Those will automatically be projected forward.
Enter estimates for future costs (and benefits) ● O ☠ V	Indicate the year in which the cost will first be incurred. It cannot be a previous year. The amount can currently only be reported as a total, rather than per household.

Spiritual/recreational value
The spiritual/recreational value associated with natural and/or built capital on a site can be valued using a simplified version of the travel-cost method that estimates the aggregate opportunity costs and actual expenses incurred by people traveling to and using the site as a proxy for the spiritual or recreational value they derive from the site. Costs incurred to maintain a site, for example to restore or enhance certain elements, can also indicate value. However, valuation should be done carefully so as not to double count values, for instance by counting donations that go toward site maintenance. See more details on estimating spiritual/recreational value in Appendix A, p. 39.

Real estate
The value of real estate will be accounted for as part of the value of the parcel, separately from the natural capital. It will be valued as an asset rather than flow, separate from the primary Discounted Cash Flow approach used to account for natural capital. Ideally, a valuation of the building or other built structure can be derived based on market pricing (e.g. leveraging comparable sales). In the absence of market data, the value of the built structure could also be very roughly approximated by factoring in construction costs. The value should, if possible, factor in depreciation based on the age and useful life of the built structure.

Deriving the final valuation

Once all sections are completed, the user will be shown the Valuation Certificate, which shows value of the parcel as a whole, as well as broken down by land use activity or resource flow. Each value is displayed in

total as well as per hectare based on the area of the parcel. The discount rate and social capital score are displayed next to each land use activity/resource flow based on the social capital survey, as well as the country's sovereign risk rate.

Total parcel value will be rounded to the nearest thousand, in order to accommodate the uncertainty in large figures. Parcel value per hectare will be not rounded, given that it is typically a smaller amount. Although these values are reported as single figures, they are only rough estimates. Data validation should be conducted across all major sensitive data inputs in order to provide a more accurate value, and in some cases, gauge the margin of error between bottom-up reported data and scientifically validated or secondary data.

The valuation results are only as good as the data that go into them. For instance, if not all sections are properly filled out, this could lead to an undervaluation of the parcel. In addition, validation of data will be key, for example by checking data roughly estimated by communities or households against data collected through a scientific or official survey. Validation of these results can be carried out by benchmarking against the value of land parcels with similar land use activities, natural and social capital conditions.

Data limitations and validation

Rough estimates of natural capital always benefit from data validation. For example, community or household level estimates of fodder consumption could be validated using a biomass survey, which could serve as an upper limit. Estimates of water consumption from an earthen pond or larger water body could also be validated by water carrying capacity calculations, which could also serve as an upper limit. The tool is best used in areas where communities, local NGOs, or others have the capacity to validate data using past data, or to improve record keeping going forward.

In areas where there is limited capacity for data validation, the users of the tool should use the final valuation as a very rough indication of the range of value, and be transparent in communicating the limitations of the valuation.

Below are some additional factors that may introduce uncertainty or error into the valuation:

- Flows vs. stocks: In some cases, the land parcel may not be used to its full biophysical potential. Users of the tool must understand and communicate to others in the community, government, and/or prospective investors, that the valuation only reflects flows based on the community's reported past and current use rather than ideal potential use of full stocks available on the parcel. This allows for cases where net benefits accounted for in the valuation could decrease even if overall land productivity remains high. For example, the net benefits derived from the land could decrease if an increasing number of households in a community diversify their livelihoods to include off-farm sources.

  If users are interested in inferring the greater biophysical productive capacity of the land parcel as an indication of land value, they need to make adjustments. They may supplement the income approach with an approach using GIS and/or remote sensing sources to infer productive capacity. For perennial species, community estimates of the quantity of consumption cannot be used as proxies for productivity given their longer-term harvest cycles. The amount of natural stocks left standing between years affects growth rates and productivity.

- Direct vs. indirect: Valuation of indirect benefits of improved management of the land parcel such as increased crop yields due to enhanced water flows relies on a technical understanding of

hydrological flows in order to accurately attribute the relationship between the target land parcel and other parcels. This is incompatible with the rapid RVT survey approach. Users of the tool would need to have access to or be able to undertake more technical studies to provide an estimate of such indirect benefits. If they are able to get data on such benefit flows, they could input it into the RVT survey, but this is likely beyond the capacity of the average RVT user.

- **Tangible vs. intangible:** Valuation of intangible forms of natural capital associated with carbon, biodiversity, and watershed services run into data gaps related to market pricing and quantification of natural capital supply itself, therefore incompatible with the current rapid survey approach which relies on back-of-the-envelope estimates. In cases where it is not possible to capture the full value of land use activities and resource flows, the user of the tool will want to make clear that the valuation of the land parcel underestimates the full value of the parcel. They may supplement it with some qualitative description of other undervalued flows. When possible, users can conduct more technical studies to value intangible values (see Box on p. 7).

Model sensitivities

The valuation is generally sensitive to the following elements of the model:

- **Projecting historical data:** The model by default uses the average of historical annual data collected for each variable to project into the future. The average calculated may not be accurate if the historical data includes outliers, but is relatively simple to use in the context of rapid rural appraisal. Projections can fine-tuned through discussions with the community about realistic trends going forward. For example, taking an average of data collected for the present year and "10 years ago" could overestimate the value of the land in a scenario where a community where the number of households and livestock are expected to decline. The assumptions for future projections can therefore be adjusted in the tool.

  Other variables such as the total quantity of fodder consumed by a type of animal in a year generally can stay more fixed, but should also be discussed, for instance if livestock are suffering from deficits in fodder consumption compared to what they need.

- **Sovereign risk rate and inflation rate:** The sovereign risk rate, a major component of the discount rate, reflects the risk of investing in a country based on a combination of political risk and legal risk. The model prompts users to enter the interest rate of the country's long-term 10-year government bond as a proxy for the sovereign risk rate because the interest rates of government bonds reflect expectations of global investors. Scholars have various approaches to estimate the sovereign risk rate with country credit ratings updated periodically as a benchmark. Users of the tool can also apply other reliable estimates but should conduct a sensitivity analysis to better understand how the results compare with those that would be generated using the 10-year government bond rate.

Given that the sovereign risk rate and the inflation rate have an endogenous relationship, the discounted cash flow model works well in most situations. Some problems might come up if the sovereign risk rate is below zero, or the inflation rate is much higher than sovereign risk rate when the country is in a period of high inflation. If the country-level data is not applicable at that time, a community-based economics survey is required.

GIS and remote sensing technology can be used to validate information about the parcel, as well as inform valuation at a larger scale.

Remote sensing specialist from Indufor checks the terrain against GIS records on the closed grazing land in Mala ka Khera, Rajasthan / October 2017

5. Data applications

After the valuation is complete, the facilitator should share the results with the community, households, or others using the tool. The process of sharing the results should be focused on validating the data, as well as used to inform decision-making by the community, households, government, NGOs, or investors. Land users may want to convene a separate discussion on how the findings from the valuation may be used:

- To inform group or individual decision-making going forward about land use allocation and natural resource management
- To communicate the value calculated from the tool to be a lower bound of the full value of the land parcel, supplemented with qualitative information about any undervalued service or assets (particularly if the valuation reveals major gaps in valuing certain ecosystem services or assets)
- To negotiate with government to formally document and/or register land parcel

- To negotiate with government and/or potential investors against acquisition, or in the case of acquisition, compensation

Sharing any data resulting from the valuation process must be done with the consent of all relevant stakeholders. For example, if some stakeholders do not want the valuation results shared publicly, they should have a say in limiting access to the results. It may be necessary to facilitate the development of a

Rural Valuation Tool meeting with community members at Basbaada Mataji Temple, sharing initial valuation results with communities across Kalayanpura Watershed in Rajasthan, India. / October 2017

data-sharing protocol among the interested parties, and those who will hold the information.

6. Appendix A: Theoretical Foundation

Framework

The Rural Valuation Tool uses a discounted cash flow (DCF) method to estimate the value of a land parcel with defined boundaries. Based on historical data and bottom-up survey information, the model projects the trends of key variables to simulate future cash flows (in n years), and incorporates a sovereign risk premium and social capital premium into the discount rate (r). The corresponding equation is:

$$\mathrm{DCF} = \sum_{i}^{n} \frac{CF_i}{(1+r)^i}$$

The tool supports natural capital accounting in rural environments, and by default accommodates the tangible benefits and costs associated with forestry, grazing, agriculture, mining, and use of water from reservoirs and other water bodies. It can also be used to value the more intangible benefits and costs associated with recreational or spiritual value. In the case of the latter, intangibles are generally still valued based on a direct use-value approach,[6] for more conservative and easier accounting, as well as relative comparability across parcels.

Social Capital

The concept of social capital broadly encompasses notions of trust, connectedness, social cohesion, and community involvement. Empirical evidence[7] shows that social capital plays a key role in the long-term maintenance of natural resources that communities rely on for livelihoods.[8] Communally-managed parcels where tenure rights are strong and community management institutions are well-functioning tend to have a better-maintained resource base in the long run. In order to assess the impact of higher or lower levels of social capital on land value, Indufor integrated a social capital score into the discount rate.

Drawing from literature review, Indufor developed a qualitative assessment tool for evaluating social capital. Indufor piloted a full version (10-page) of social capital questionnaire, but found it inefficient for community focus group discussions. Therefore, Indufor revised it to a shorter version with a set of 14 questions focusing on core objective indicators measuring the level of land tenure security, community cohesion, and resource governance capacity. Together these questions reveal a community's ability to sustainably manage and benefit from natural resources on a specific parcel.

For private sector investments, credit ratings are made to establish creditworthiness on a debtor's ability to pay back debt by making timely interest payments and the likelihood of default. Credit ratings affect the interest rate at which a company can borrow money, and the expected returns of a security, with higher ratings leading to lower interest rates.[9] [10] [11] Similarly, the level of social capital security influences the risk or creditworthiness of deriving future benefits from the land for local communities. With inspiration from credit rating approaches, Indufor developed a social capital ratings approach to translating the qualitative results of social capital survey into a rating that can feed into the discount rate portion of the DCF model.

The social capital quantification approach is similar to Moody's risk assessment methods. Moody's ratings are forward-looking, reflect expectations of future financial and operating performance, and enable informed peer comparison. The major factors used by Moody's for building qualitative risk indicators have been adapted in our approach to include:

- Level of risk taken by land owner, occupants, and investors, combining sovereign and parcel-level risk
- Level of land tenure security
- Level of community capacity and experiences in managing the parcel

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[6] Jantzen, J. The economic value of natural and environmental resources. http://www.i-tme.nl/pdf/assessment%20of%20econ%20value%20of%20environment%20final.pdf

[7] Pretty, J. (2003). Social capital and the collective management of resources. Science, 302(5652), 1912-1914.

[8] Katz, E. G. (2000). Social capital and natural capital: A comparative analysis of land tenure and natural resource management in Guatemala. Land Economics, 114-132.

[9] Moody's (2016). https://www.moodys.com/researchandratings/methodology/003006001/rating-methodologies/methodology/003006001/4294966628/4294966848/-1/0/-/0/-/-/en/global/rr

[10] Standard & Poor's (S&P) (2016). Ratings Criteria. http://www.standardandpoors.com/en_US/web/guest/ratings/ratings-criteria

[11] Fitch Ratings (2016). Ratings Criteria. https://www.fitchratings.com/site/criteria

Indufor developed a questionnaire regarding the above factors, assigning different weights (Table 3) and scores for each question and answer (Table 4). The results of the questionnaire produce a weighted-sum social capital score of 0-20 (20 being the highest score corresponding to highest social capital) that allows for comparison of social capital across land parcels.

The highest weight (a total of 55%) is given to land tenure security for its critical role in enabling sustainable land management. Land tenure is sometimes used interchangeably with property rights. Property rights are more inclusive, with property broadly ranging from land and real estate to movable assets, or even intangibles like patents and ideas. Land tenure on the other hand is defined as the relationship that people, groups, or entities have with land and land-based resources. [12] The relationship is defined by rules that guide how land is allocated, used, managed, and transferred. Rules related to land tenure, either customary or statutory, can create powerful incentives for people occupying the land to strengthen their land and resources management. Positive incentives provided by secure land tenure could provide the foundation for a sustainable development plan with a long-term horizon. Communities tend to be more willing to conserve resources and invest in improving land if their tenure rights are secure. On the contrary, without secured tenure, people are more likely to overuse or misuse land.

The social capital scores correspond to 20 different notches, each of which corresponds to an alphanumeric rating (Aaa - Ca) according to Moody's criteria (Table 5).[13] The rating in turn links to an estimated discount rate spread (0%-12%) based on current market interest rates.[14] The discount rate for a DCF model would be determined by the following equation:

$$Discount\ Rate = Risk\ Free\ Rate + Sovereign\ Risk\ Premium + Social\ Capital\ Risk\ Premium$$
$$= Sovereign\ Risk\ Rate + Social\ Capital\ Risk\ Premium$$

Sovereign risk rates are unique to each country and updated periodically. In practice, it is recommended to use the interest rate of the country's 10-year Treasury Bond as a proxy for the sovereign risk rate. Parcels that score a 20 are assigned the same discount rate as the sovereign risk rate, with social capital risk premiums added for each score below 20.

In cases where the land parcel is for private rather than communal use, the social capital questions may be reinterpreted accordingly.

Natural Capital

Natural capital is commonly thought to encompass the aggregate assets or stocks that provide both natural resources (tangible) and environmental services (intangible).[15]

Tangibles

Tangible natural capital comes in a wide range of forms. Informed by literature review, Indufor built valuation models for agriculture, harvesting of timber and non-timber forest products, grazing, aquaculture production, fishery production, and artisanal mining. To complement natural capital, housing/real estate and vacant land may also be valued using the tool as forms of built capital. For each land use activity type, Indufor performed cost-benefit analysis, and designed questions for collecting historical data and projecting future trends.

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[12] Food and Agriculture Organization of the United Nations (FAO) (2016). What is land tenure? http://www.fao.org/docrep/005/y4307e/y4307e05.htm

[13] Moody's (2016). https://www.moodys.com/researchandratings/methodology/003006001/rating-methodologies/methodology/003006001/4294966628/4294966848/-1/0/-/0/-/-/en/global/rr

[14] Damodaran, A. (2015). Country Risk: Determinants, Measures and Implications–The 2015 Edition. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2630871

[15] OECD (2005). Glossary of Statistical Terms. Retrieved from https://stats.oecd.org/glossary/detail.asp?ID=1730 World Forum on Natural Capital (2015). Retrieved from http://naturalcapitalforum.com/about/

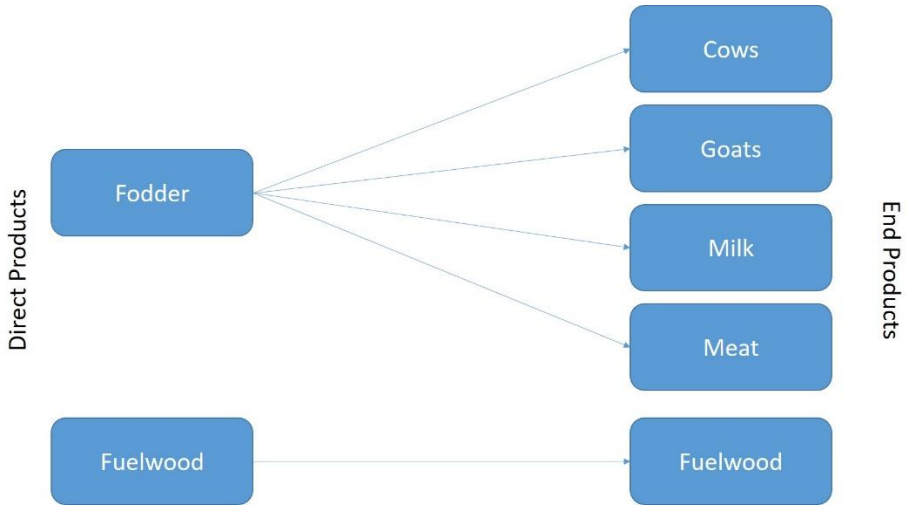
Following field testing in India, Indufor adjusted survey questions to be more applicable for data collection at the community level. The language of questions was rephrased to acquire information more specifically. Indufor also took other rural-contextual problems into consideration, such as data availability of community surveys, seeking proxies for market price in a non-market area, scientific conversion of local units, physical land types and legal land uses. The refined tangible natural capital questionnaire focuses on five modes of tangible natural capital: 1) harvesting of forest products, 2) agriculture, 3) grazing, 4) mining, and 5) water use.

The approach to estimate annual cash flows ($CF_{x,i}$) for harvesting of forest products, agriculture, and mining is straightforward because products are directly consumed or sold by individuals or the community. Key variables include harvesting/extracting frequency ($f_{x,i}$), quantity harvested each time per household ($Q_{x,i}$), number of households ($H_{x,i}$), and market price of the harvesting/extracting product ($P_{x,i}$). The annual cash flow for benefit x of year i equals:

$$CF_{x,i} = f_{x,i} \times Q_{x,i} \times H_{x,i} \times P_{x,i}$$

It is possible to value these flows of natural capital through the flow of net benefits from direct products because they also are end products. For instance, fuelwood gathered in forests can be directly used by households or sold on the market. Thus, fuelwood is both a direct product (acquired from the land) and an end product (consumed/sold). However, fodder is not an end product but rather an input for other products. In this case, the end products of fodder-based natural capital include livestock (e.g. goats, cattle) and their byproducts (e.g. milk, meat, hide). Figure 2 explains the relationship between direct products and end products.

Figure 1: Relationship between Direct Products and End Products



The avoided cost approach can be used to value flows of natural capital for which income data for direct products are not available. For example, fodder grazed or cut-and-carried off from a parcel of land provides benefits in the form of avoided costs, i.e. what people would have had to pay by buying an equivalent amount of fodder from the market. Annual avoided costs for fodder can be estimated based on estimates of the amount of fodder from this parcel consumed by each livestock in a year. Key variables include number of months of a year grazing livestock on the parcel ($M_{x,i}$), total amount of fodder consumed per animal per year ($Q_{x,i}$), number of livestock ($N_{x,i}$), and market price of fodder ($P_{x,i}$). The annual flow of fodder benefits consumed by animal x of year i equals:

$$CF_{x,i} = \frac{M_{x,i}}{12} \times Q_{x,i} \times N_{x,i} \times P_{x,i}$$

Similarly, water acquired through the physical water body on this parcel can also provide benefits in the form of avoided costs. The amount of water use should be accounted for thoroughly by including both on-site water use and the amount of water extracted for use by individual households and public forums offsite. Examples of onsite water use may include drinking water for livestock, and water for laundry and bathing. Community-reported data on the amount of water use can be validated against measurements of the annual carrying capacity of the water body.

Historical data collected through community surveys are used to analyze and understand patterns and trends of generating benefits from the land. Based on the analysis, future benefit and costs of each activity are projected, taking into account economic inflation and any future community development plans. 15 years is set as the standard number of years projected across all land use activities. Projections for agriculture, grazing, and mining are typically done for a lower number of years given their shorter-term natural resource management regimes. However, 15 years here is set as the standard number of years in order to allow for accounting of shorter and longer-term management regimes on the same parcel, matching with the period used for longer-term management regimes for timber and other forest products which are based on longer harvest rotations.

To quantify the benefits derived from various land uses so as to add to the land value, it is necessary to introduce a market price for products derived from those various land uses. However, obtaining market prices can be difficult in rural context, especially in areas where markets are illiquid. Other public data for market prices are available. For instance, the minimum daily wage at state level could be used as a proxy for labor cost, and average market prices for clothes or shovels (products purchased on the market) can be used for calculating the market price of fodder or crops on a barter system basis. Currency and units used for data collection should be standardized during the land valuation process.

Intangibles

Spiritual and Recreational Value

A site with spiritual or recreational value can include significant built infrastructure and/or natural infrastructure. While the natural capital approach discussed above can be used to value any direct products that can be derived from a parcel (for instance fuelwood, medicines, and fodder gathered from a sacred grove) there are qualities to these spaces that are less easily quantifiable.

Valuing the more intangible spiritual or recreational value of a site requires a different approach, and will be necessarily limited by the difficulty to value the often ‘priceless’ nature of such sites. The tool provides guidance inspired by the travel-cost method to estimate the aggregate opportunity costs and actual expenses incurred by people traveling to and using the site as a proxy for the spiritual or recreational value they derive from the site. Expenses such as donations may also be factored in as a proxy indicator of how much people value the site. Costs incurred to maintain a site, for example to restore or enhance certain elements, can also indicate value. However, valuation should be done carefully so as not to double count values, for instance by counting donations that go toward site maintenance.

Given the major costs to conduct traditional travel-cost studies, the guidance for the Rural Valuation Tool proposes a streamlined version relying on averages and community estimates. Averages could be derived by conducting a survey on the amount of time that people spend visiting for major events such as an annual festival, versus the amount of time that people spend visiting regularly, and finally for irregular tourism. Averages can also be derived for the amount of distance that people travel from different regions, and associated average travel expenses, e.g. spent on gas or public transportation. Average socioeconomic levels will also need to be derived as a crude measure of inferring the opportunity cost of

people traveling from different regions. Ideally the survey could be done in person at major events or indicative days, but short of that, data validation will be needed for community estimates based on recordkeeping for visitors and donations. This may be difficult in areas where there is no entrance fee nor formalized entry documentation (e.g. check-in process, book signing).

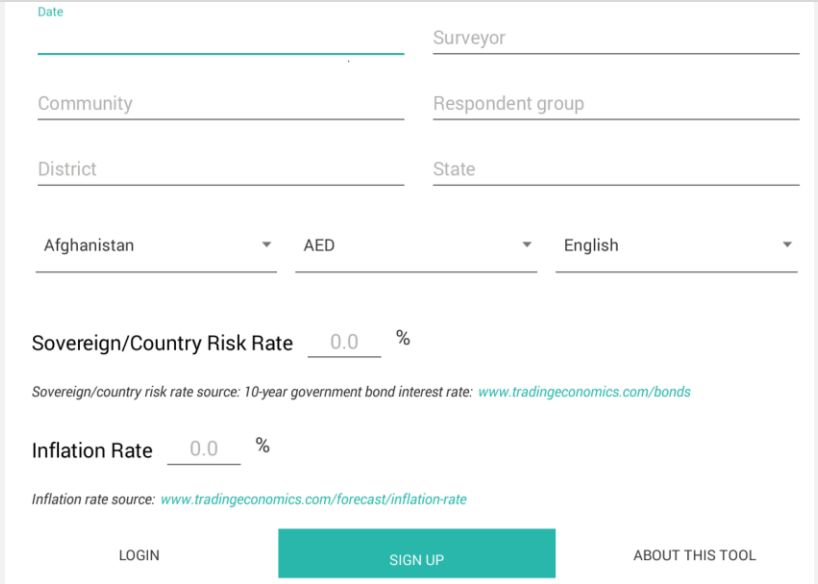
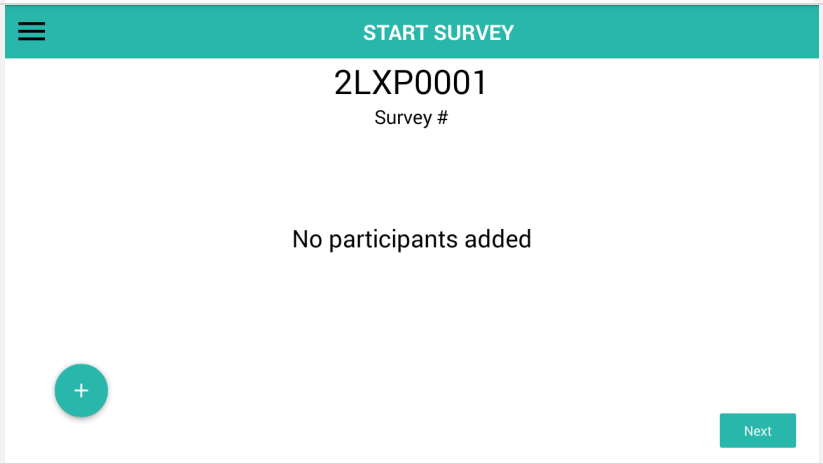
When calculating the cost spent traveling and at the site, the cost should be discounted because people will also be deriving benefits from visit itself, as well as the journey. The discount factor can be adjusted in a sensitivity analysis based on case-specific factors, for example if the travel route is more or less scenic, or if the trip is multipurpose.[16]

Key to consider is that the number of hours spent at or traveling to a site may not be necessarily correlated with the actual spiritual benefits obtained from the site. For instance, people may frequent a church every week of the year but potentially derive a much greater amount of spiritual value from visiting a unique temple once in their lifetime. Contingent valuation could be used to estimate the worth of such sites, but would require extreme care in the phrasing of questions. Answers to questions may be sensitive depending on the payment vehicle—e.g. donation or tax—but also may risk misinterpretation by people who may suspect that they will lose free access to the site, depending on the country and local settings. The travel-cost method would provide a cost-based approach as an indication of willingness to pay in actual and opportunity costs to maintain, access, and use a site. For some sites, people may have limited ability to pay if they are poor, both in terms of more limited transportation costs incurred and lower opportunity costs given their lower daily wages. For example, a sacred site of a small indigenous group may be less quantifiably valuable than a conventional temple or church that is the site of pilgrimages for a larger social group, who are wealthier and can donate more or travel from a greater distance. The former may be perceived as priceless by the small indigenous group, despite the lower cash or barter market value of their offerings or opportunity costs, and limited infrastructural improvements. This is a limitation of the travel-cost method. Because the method is imprecise, it is key to supplement it with qualitative information on the value of the site to users as well. The strength of the travel-cost method lies in anchoring the valuation of these sites based on concrete assumptions, which could understate the 'priceless' value of such sites but be more defensible than contingent valuation.

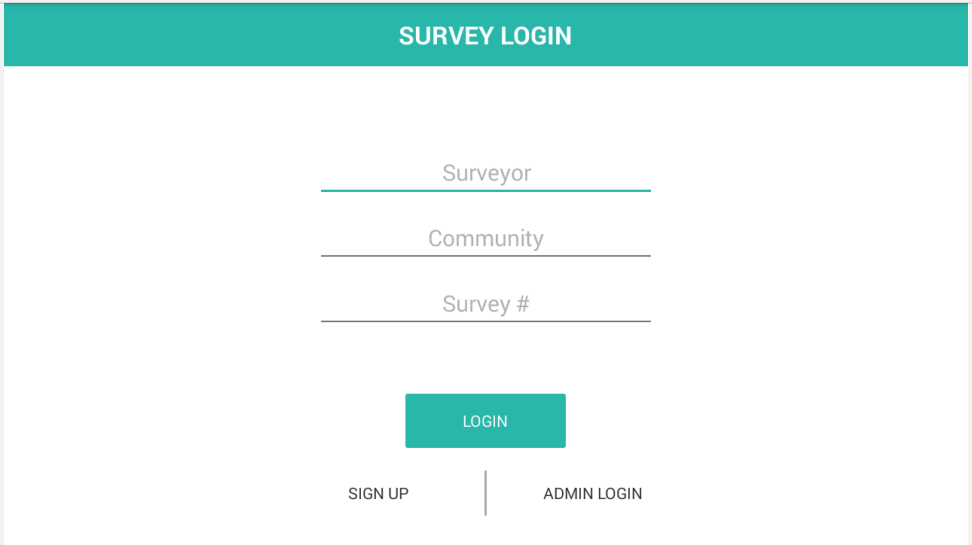
[16] Mendelsohn, R., Olmstead, S. (2009). The economic valuation of environmental amenities and disamenities: methods and applications. Annual Review of Environmental Resources 24: pp. 325-347.

7. Appendix B: Survey (Android Tablet Format)

This section walks users through how to use the tablet-based version of the valuation tool. It focuses on the technicalities of the app. Field-oriented guidance on implementation and framing of different survey questions is included earlier on in the **Conducting Surveys** section.

Sign Up to Start a New Survey	
	Record the date and location of the survey taking place. The app is available in English and Hindi. For other languages, facilitators can adapt and translate the questions. For currency, enter the three-letter abbreviation, e.g. USD. If more than one group is surveyed in the same community, indicate a unique group name in "Respondent group." Enter the surveyor's name under Surveyor. Reference the sovereign/country risk rate using www.tradingeconomics.com/bonds and country-level inflation rates at www.tradingeconomics.com/forecast/inflation-rate. If possible, use a more accurate inflation rate from the state level, or for rural areas, citing a country's office of statistics. If you have already started a survey and want to access it again, click **Login** at the bottom.
	Upon clicking "Sign Up," you will be led to a new page that shows your Survey #. Record the Surveyor, Community, and Survey # to be able to login again later.

Login to Existing Survey / the Admin Panel

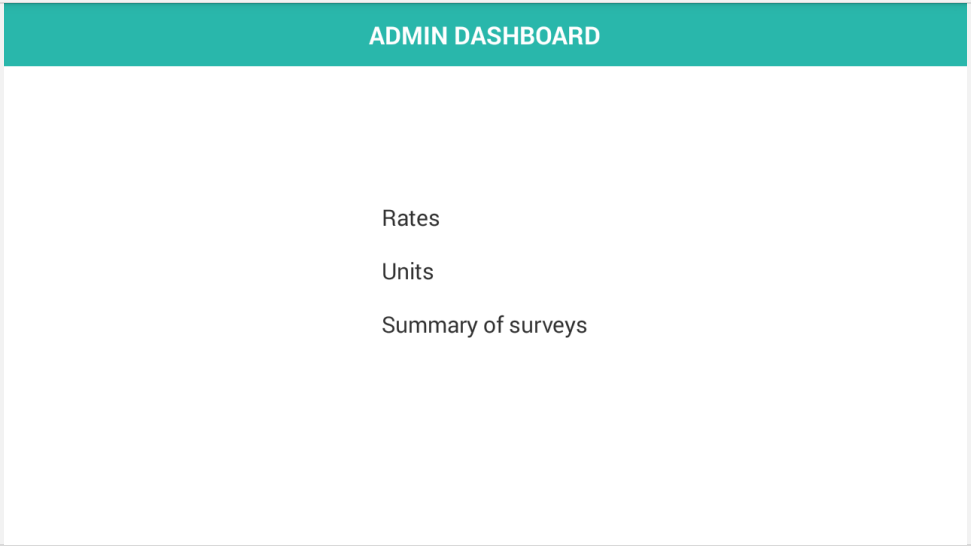


Access an existing survey
Enter the name of the surveyor and community exactly as you entered when first signing up.

Use the Survey # that was generated when you initially signed up.

Login as an administrator
Click on **Admin Login.**

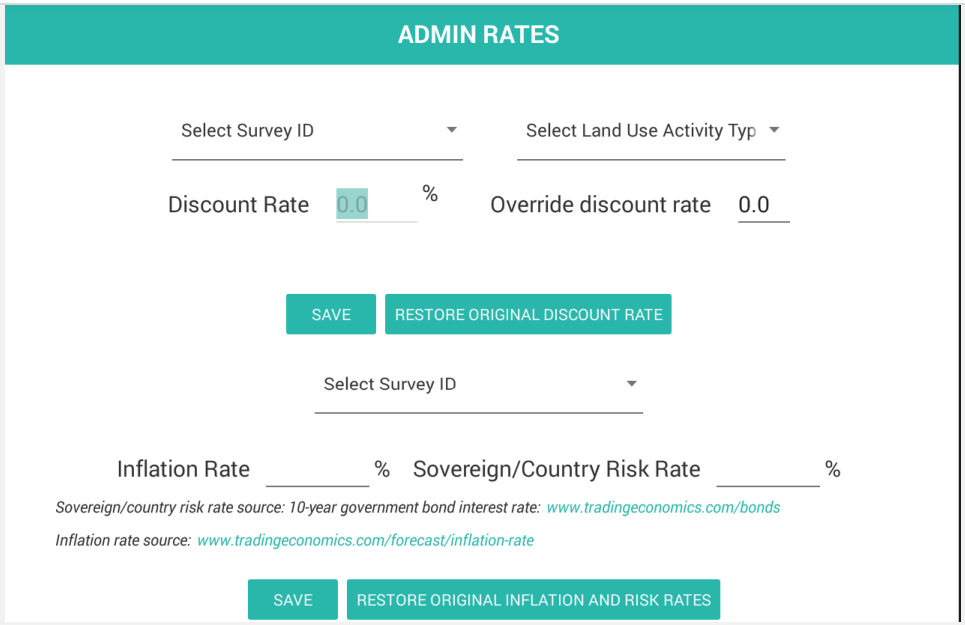
Admin Dashboard



To edit the discount rate, inflation rate, or sovereign/country risk rate, click **Rates**.

To edit units, click **Units**.

To see a summary of all surveys entered on the tablet so far and export data, click **Summary of surveys**.



Discount rates

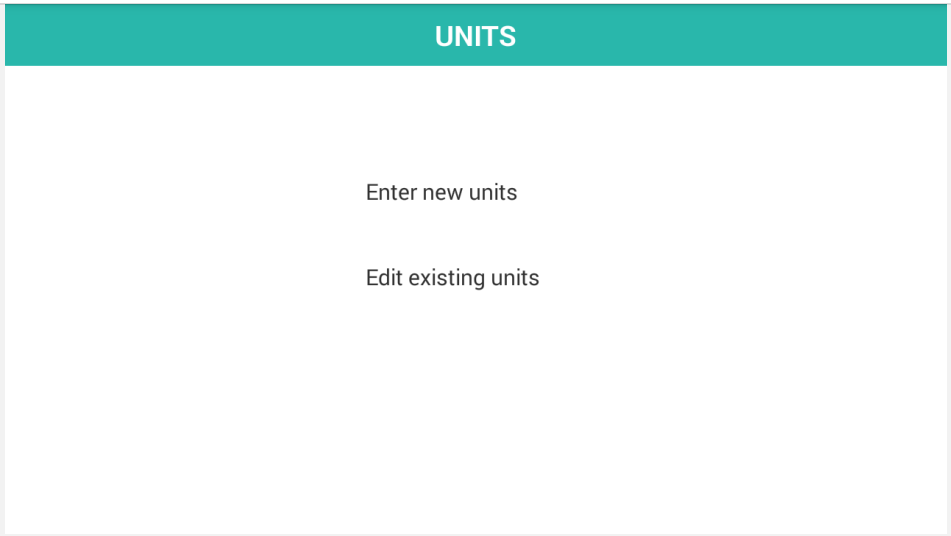
It is possible to view any discount rates generated for existing surveys for which you have filled out the Social Capital section for a specific land use activity or resource flow. The discount rate will be loaded to the left, corresponding with the chosen Survey ID and land use activity. It is generally recommended to influence the discount rate directly by revising answers to the Social Capital survey questions themselves. However, if you want to manually override the discount rate—perhaps to see how sensitive the valuation is to change—enter a new discount rate on the right. You have the ability to restore the original discount rate here by clicking **Restore original discount rate.**

Inflation rate

It is recommended to use the average inflation rate from the most recent year. Country-level inflation rates are available at www.tradingeconomics.com/forecast/inflation-rate. If possible, use a more accurate inflation rate from the state/provincial level, or for rural areas, by checking a country's office of statistics. The chosen inflation rate will apply across all surveys. You can restore the inflation rate you entered during initial signup by clicking **Restore original inflation and risk rates.**

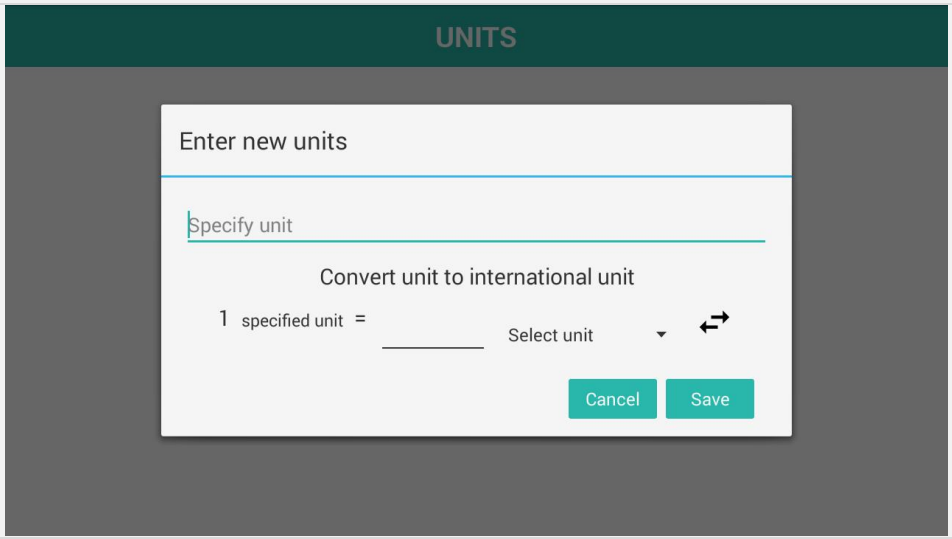
Sovereign/country risk rate

It is recommended to use the average sovereign/country risk rate from the most recent year. You can use the 10-year bond rate using www.tradingeconomics.com/bonds; use the price in the second column that corresponds with the country of interest. The chosen risk rate will apply across all surveys. You can restore the sovereign/country risk rate you entered during initial signup by clicking **Restore original inflation and risk rates.**

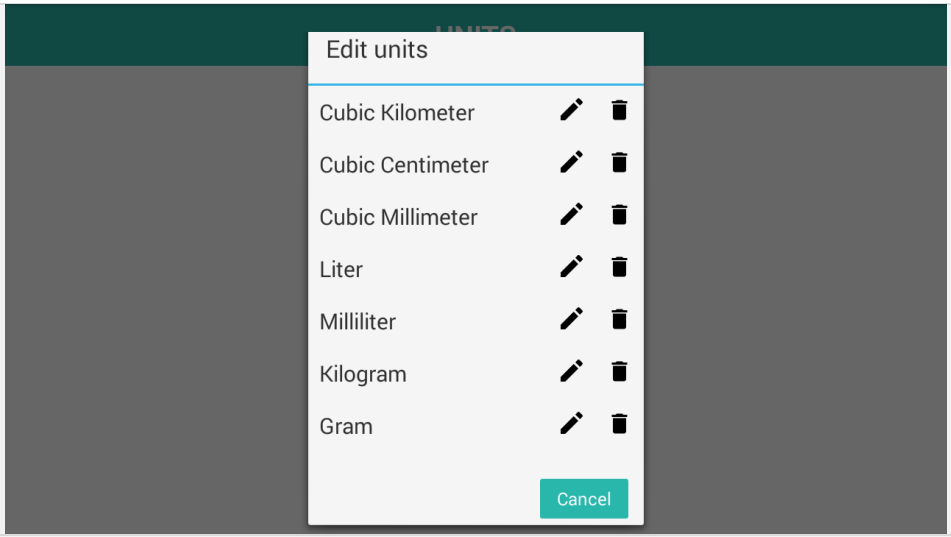


Click **Enter new units** if you would like to enter local or other units not included in the default survey options. The default units generally include all common international standard units using the metric system.

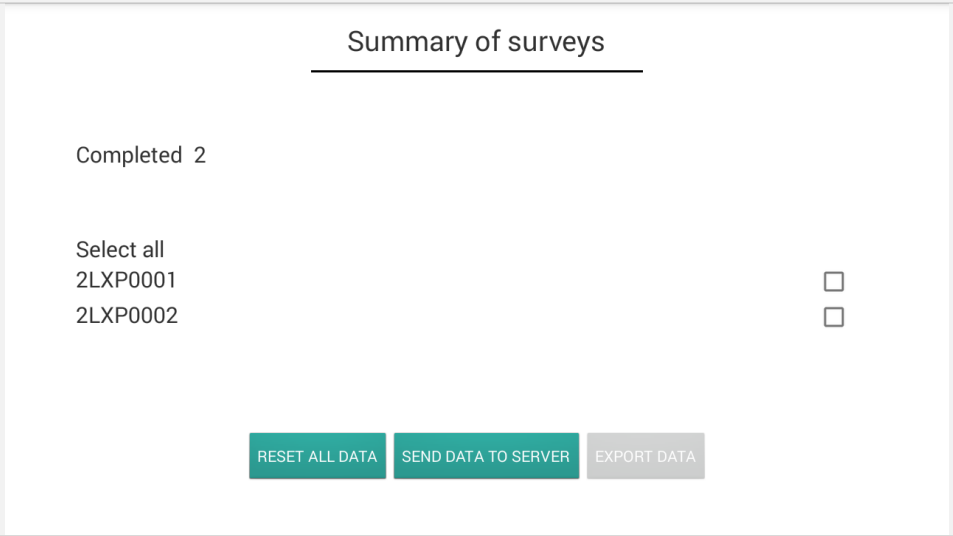
Click **Edit existing units** if you would like to edit the conversion factors for existing units.



Once saved, the units will automatically appear in the survey dropdowns.



Click the pencil icon next to each unit to edit the conversion factors for the unit. Click the trashcan icon to delete the unit. Once saved, the units will automatically appear in the survey dropdowns.



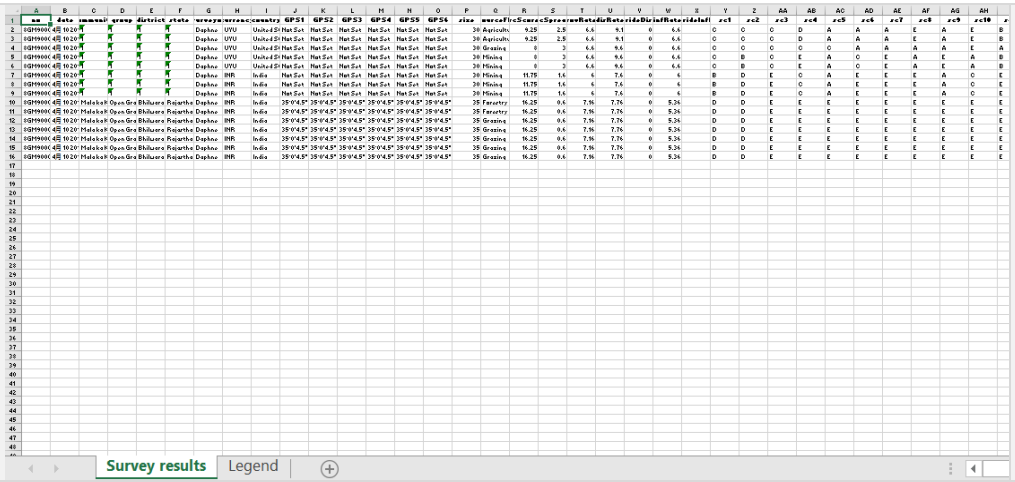
To delete all existing survey data, click **Reset all data**.

Export data from surveys after selecting the specific surveys you would like to send, or clicking **Select All**.

To export the survey data to the connected online survey, click **Send data to server**.

Once the data has been sent to the server, **Export data to email** will also be activated such that the user can directly send the survey data to email inboxes. Clicking "Export data to email" will prompt you to enter recipient email addresses.

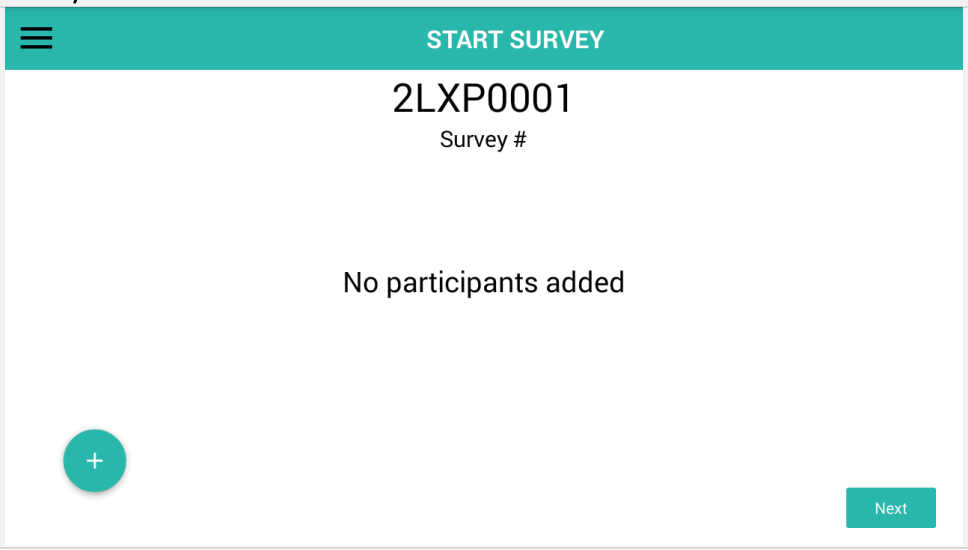
Data Export Format



The data will be exported as an Excel file. This is especially useful when the user wants to revise data more easily from a computer or conduct statistical analysis across many parcels.

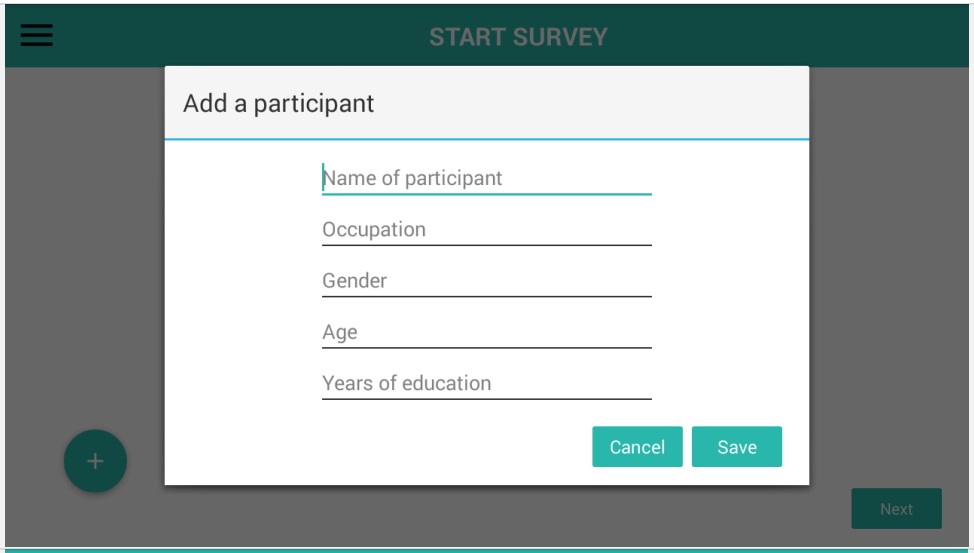
The Excel output includes two tabs, one with the survey results, and one with a legend explaining the shorthand headings corresponding to each of the survey questions.

Survey Basics

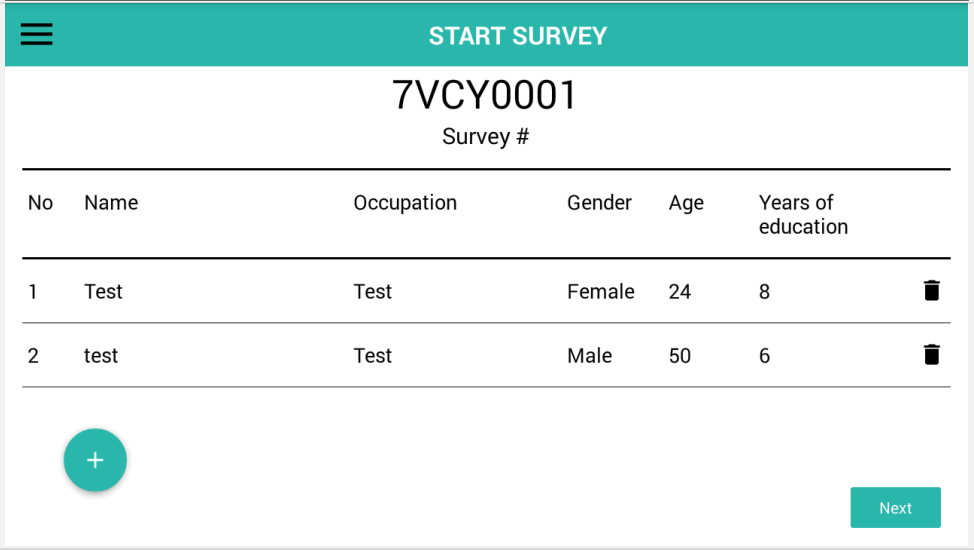


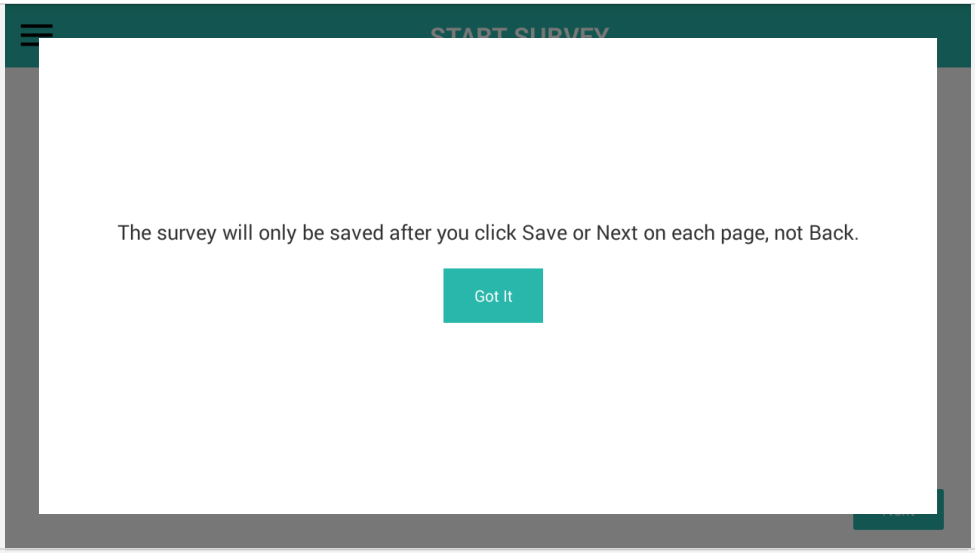
Upon signing up, you will be led to a page where you can add the survey participants by clicking the **+** button in the bottom right.

This is an optional but recommended page to fill out, as it can help document the individuals who attend the survey session. This provides ownership and turn helps track participation rates and inclusiveness, as well as enabling easier follow-up with individuals to validate certain questions and to share final valuation results.

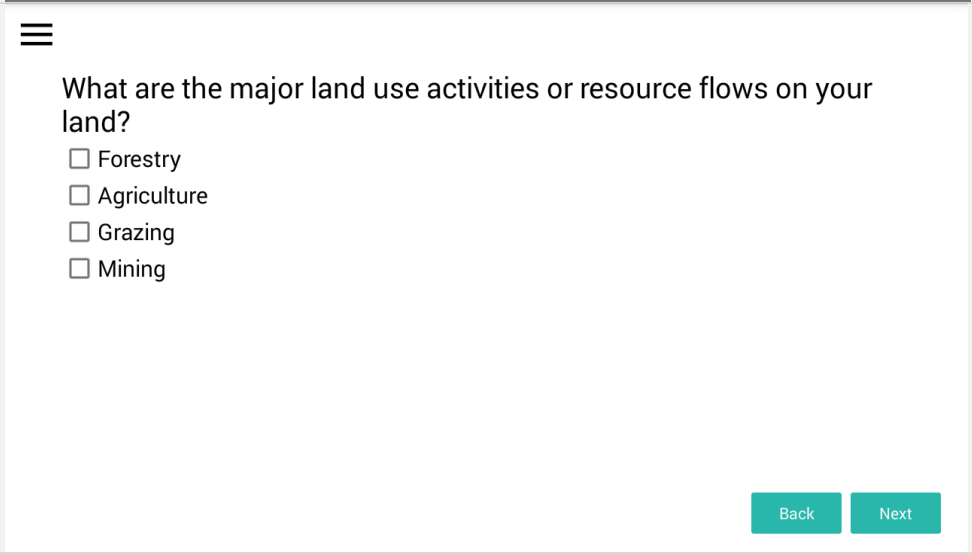


Add details for participants one by one. This process can be time-consuming if there are many participants. In some cases with limited time, it may make more sense to initially write down the names of participants and then follow up with them to fill in other details after the survey efforts itself.





This provides a caveat that data entered on the current page will only be saved if the user clicks Next, or Save if there is a Save button. Clicking Back will clear any data entered on the current page.

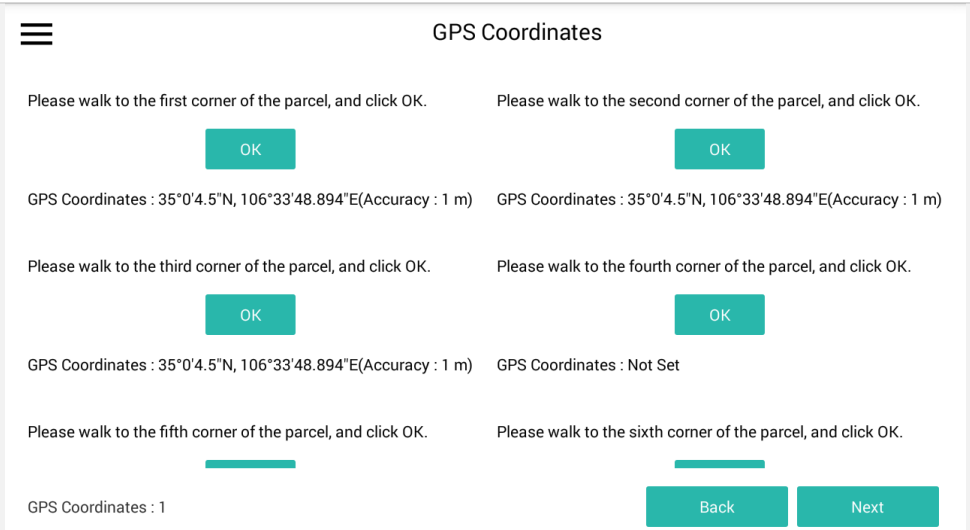


Check all of the major land use activities or resource flows occurring on the target land parcel. For example, if a single land parcel is used for silvopasture, select both the “forestry” and “grazing” options.

Activities selected here will activate corresponding survey sections to value the natural capital associated with that specific activity on the parcel, informed by social capital considerations.

Plotting out the major GPS coordinates of the land parcel is used to locate the land parcel and also estimate its area in hectares.

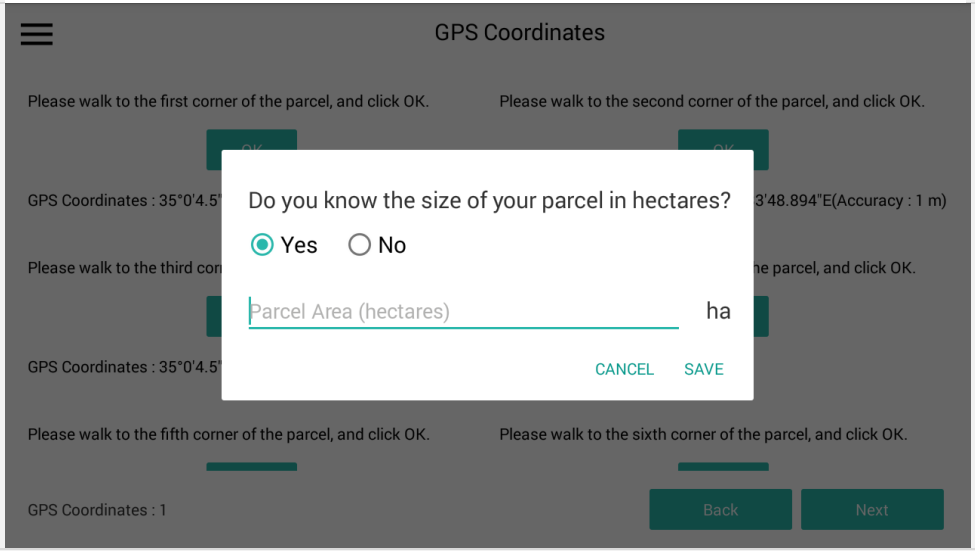
It is possible to map up to six points covering the major edges or vertices of the land parcel. As few as three can be mapped.



This step should be done by or with someone who is very familiar with the boundaries of the parcel. It is sufficient to walk to major vertices that, when connected with straight lines, form a decent map of the territory of the parcel. When standing at each major vertice or corner, click yes for that 'corner.' Corresponding GPS coordinates should instantly load in the app.

Note that this only plots major points, and does not trace the entire outline of the parcel. This approach is more conducive to mapping heavily forested or vegetated areas where it is difficult to walk along the full boundary of the parcel.

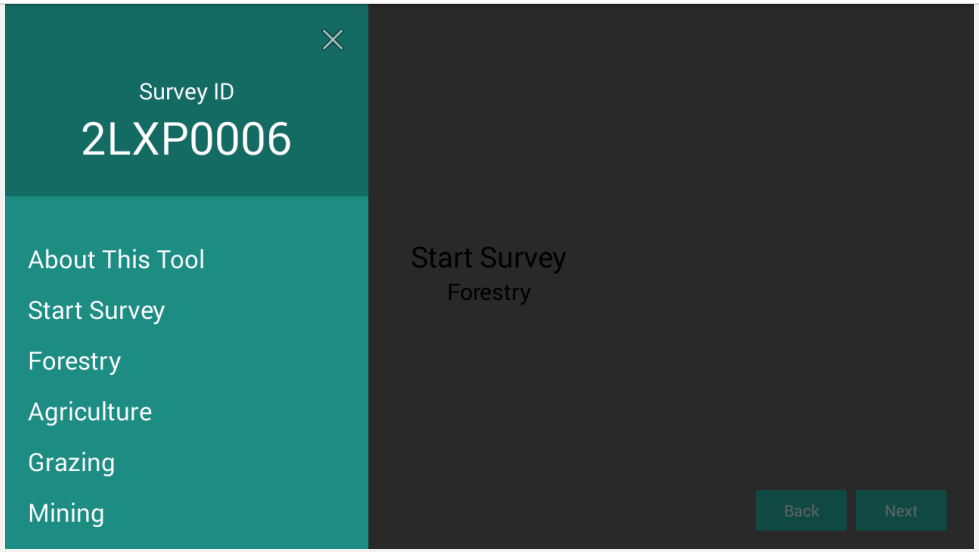
If it is not possible to walk the parcel, the user can click next. This step is optional.



The user should have an estimate of the size of the parcel in hectares. This step is mandatory, and can be adjusted later.

At this stage, the mapping from the previous page does not auto-generate area yet. The area must be calculated or estimated separately.

Menu Navigation



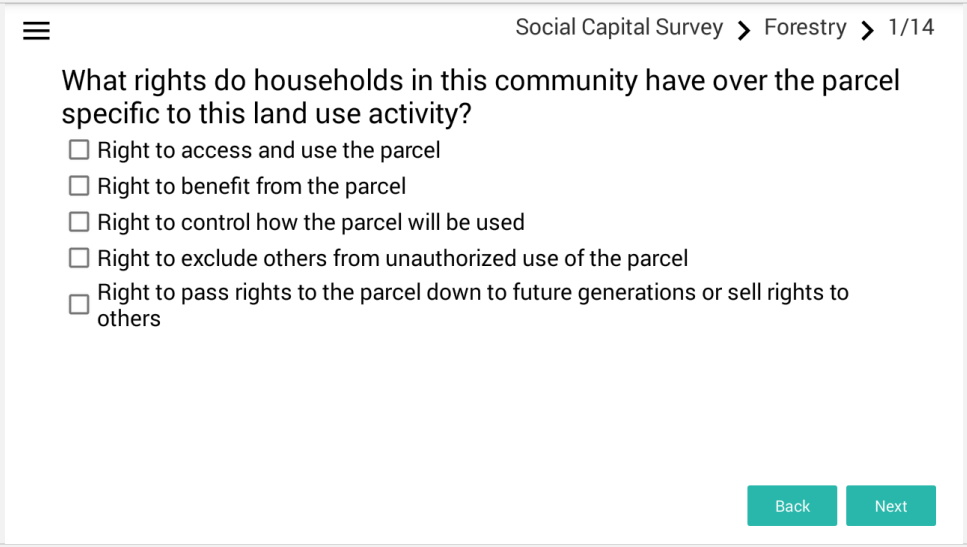
Once you have selected the major land use activities associated with the land parcel, it is possible to navigate directly to their corresponding surveys by clicking on the three small bars in the top left corner of the screen. Doing so will load the menu, displayed to the left together with the Survey ID.

From the menu, the user can access any of the land use activity sections selected. Clicking one of the land use activity sessions will load the very beginning of the section. If the user wants to edit natural capital questions, they need to click through the social capital survey questions for that land use activity first.

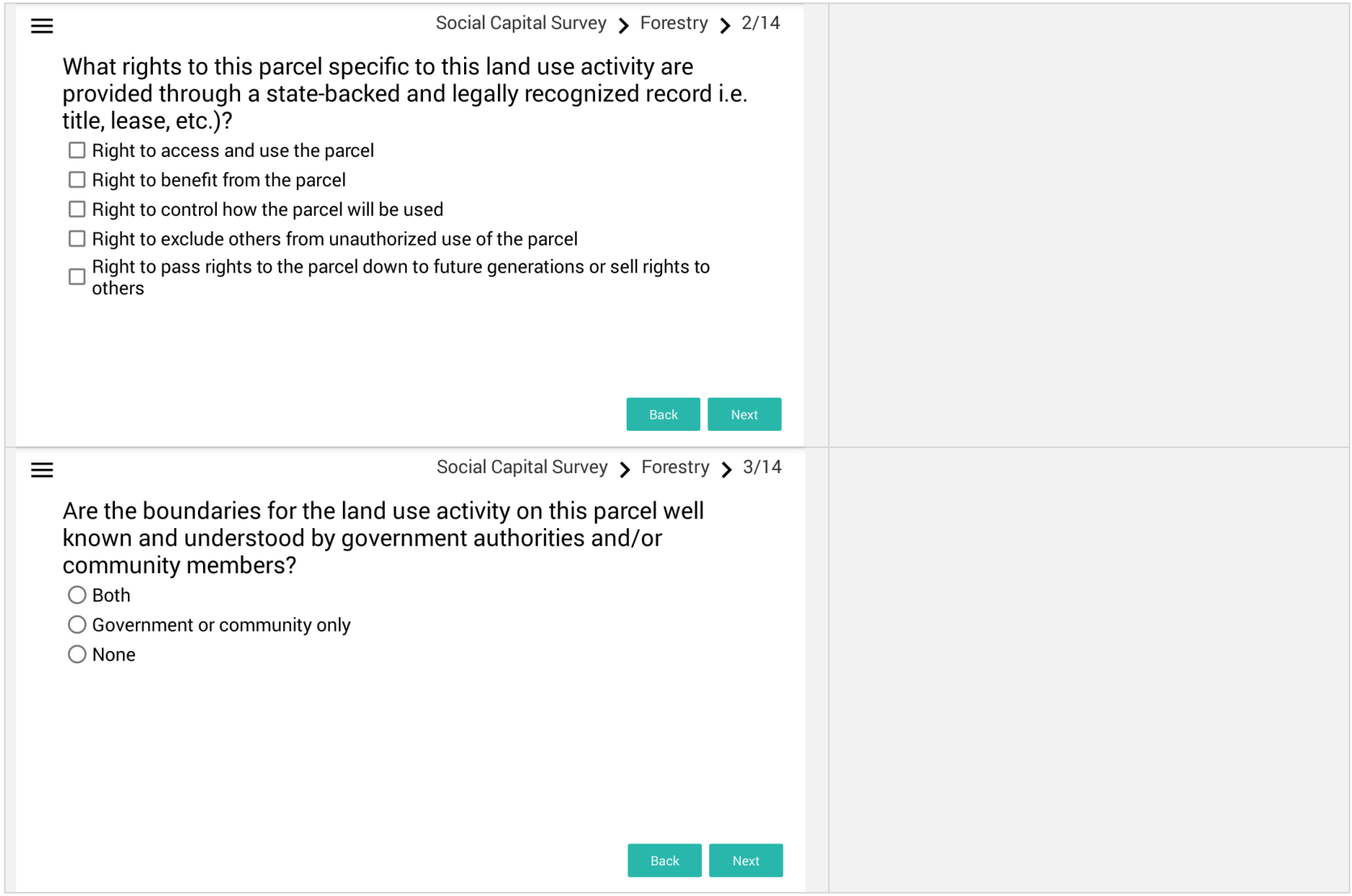
If at some point the user wants to delete one of the land use activity sections, they can return to the "Start Survey" option and uncheck a specific land use activity, and save. This will remove the unselected land use activity from the valuation.

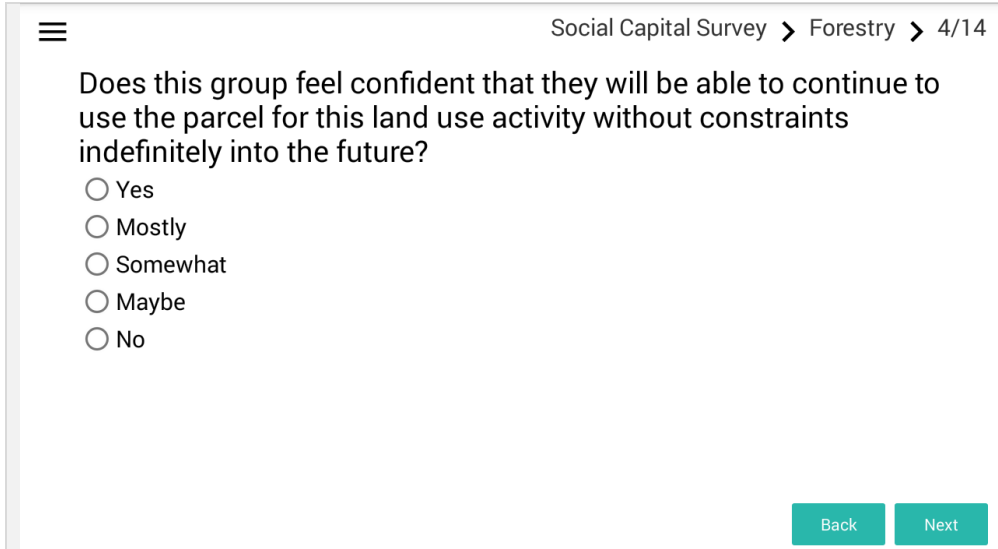
At the bottom of the menu it is also possible to log out of the current survey.

Social Capital Survey

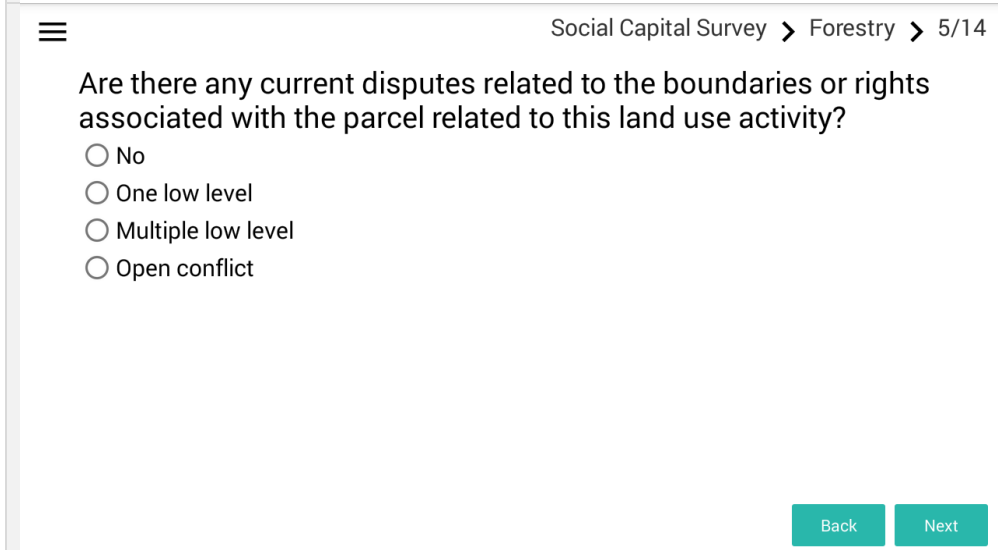


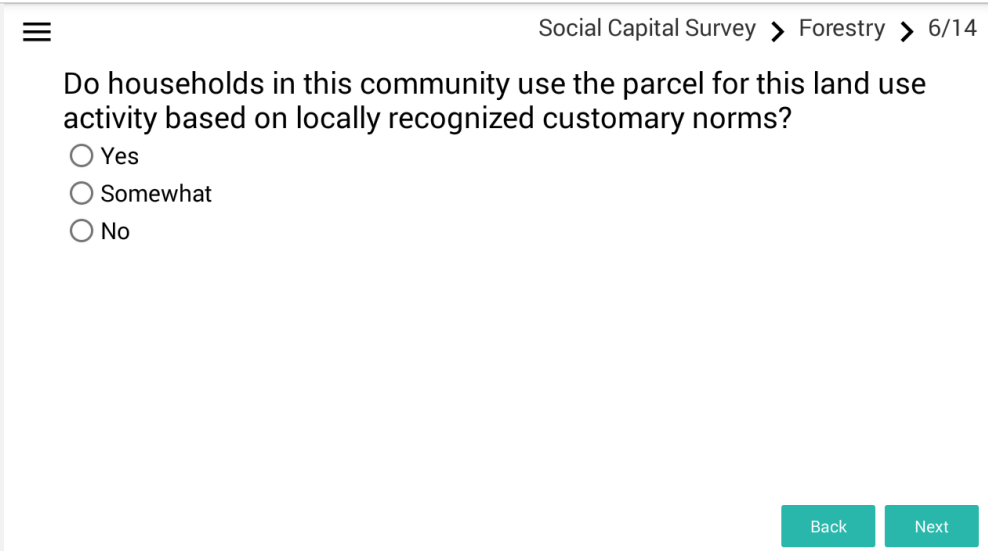
If the parcel is managed as private rather than common land, adjust the question by substituting "this group" with "the individual/household/organization."


Social Capital Survey › Forestry › 2/14
What rights to this parcel specific to this land use activity are provided through a state-backed and legally recognized record i.e. title, lease, etc.)?
Right to access and use the parcel
Right to benefit from the parcel
Right to control how the parcel will be used
Right to exclude others from unauthorized use of the parcel
Right to pass rights to the parcel down to future generations or sell rights to others
Back
Next
Social Capital Survey › Forestry › 3/14
Are the boundaries for the land use activity on this parcel well known and understood by government authorities and/or community members?
Both
Government or community only
None
Back
Next

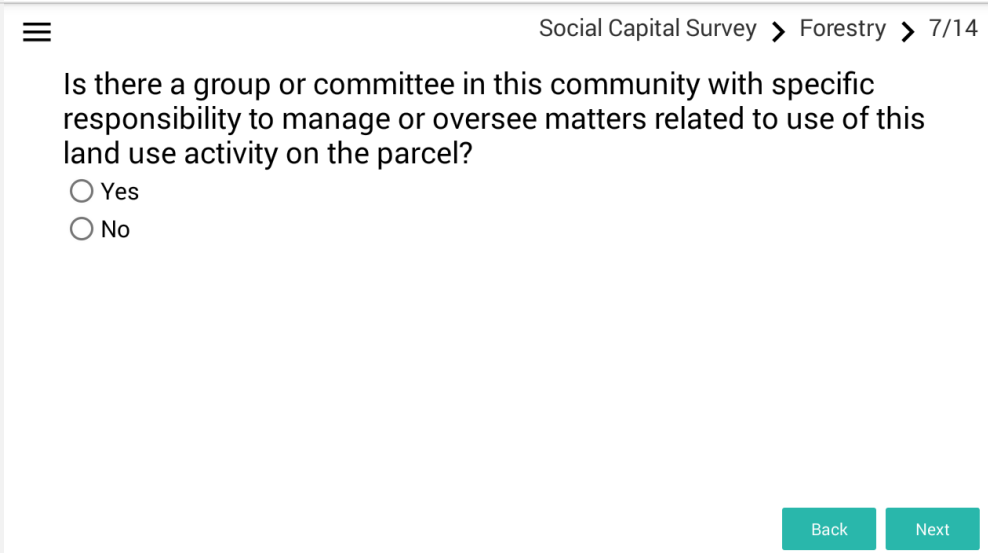


If the parcel is managed as private rather than common land, adjust the question by substituting "this group" with "the individual/household/organization."

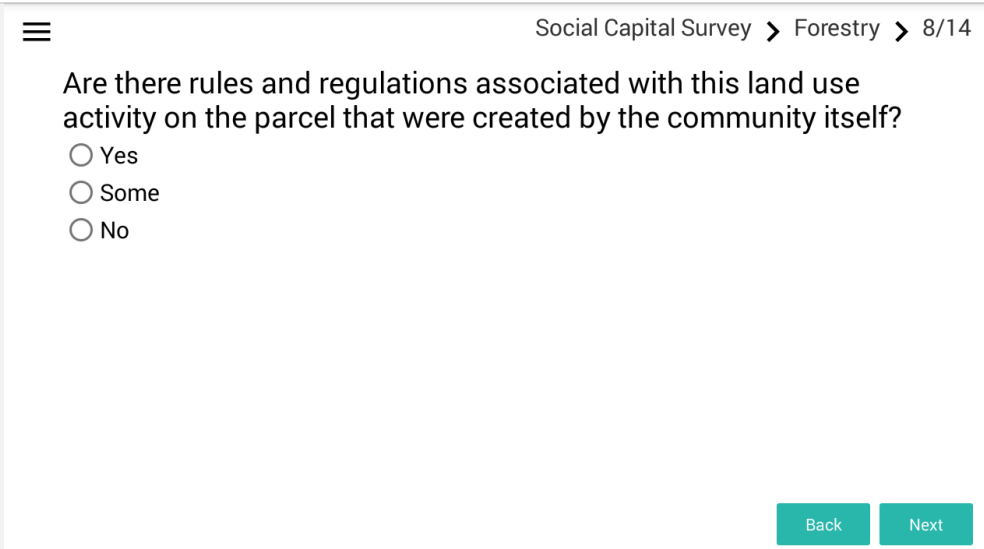




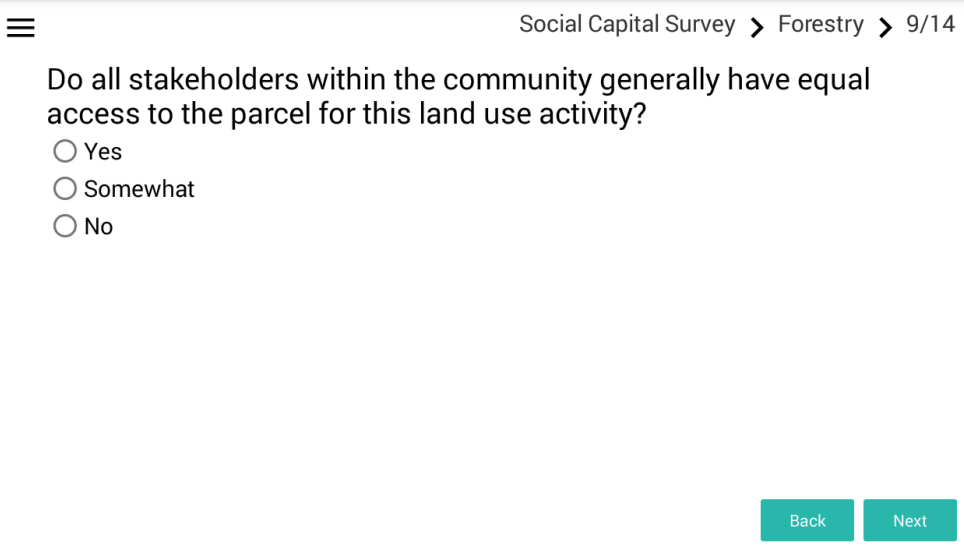
If the parcel is managed as private rather than common land, adjust the question by substituting "households in this community" with "the individual/household/organization"



If the parcel is managed as private rather than common land, adjust the question by substituting "this group" with "the individual/household/organization." Check "Yes" by default.

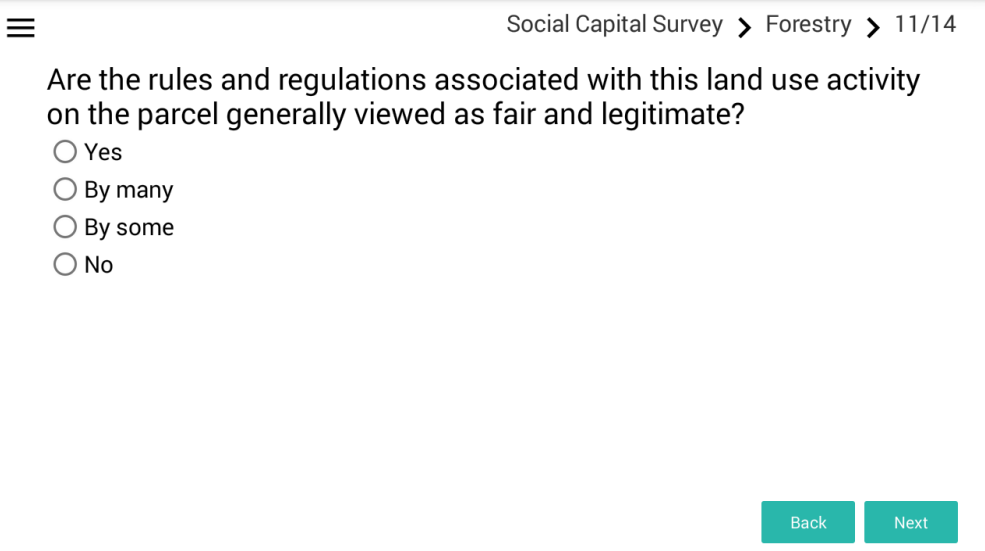


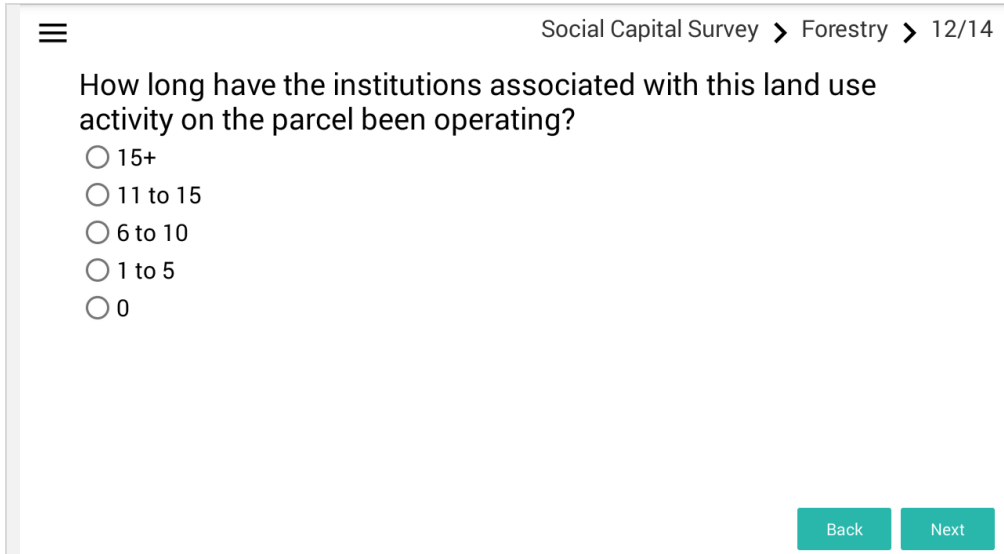
If the parcel is managed as private rather than common land, adjust the question by substituting "community" with "individual/household/organization"

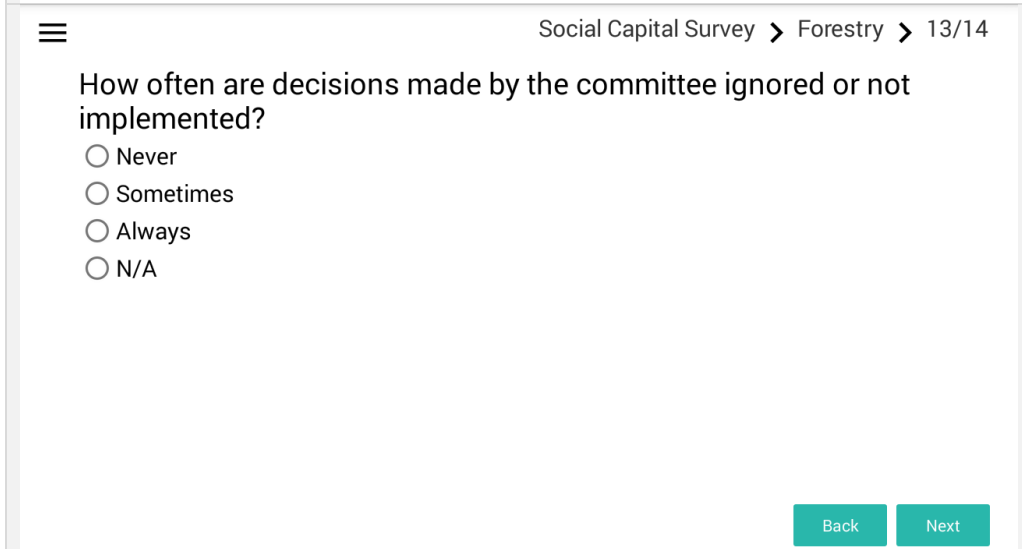


If the parcel is managed as private rather than common land, adjust the question by substituting "within the community" with "within the household/organization" if dealing with a household or organization. If dealing with a single individual, check "Yes" by default.

If the parcel is managed as private rather than common land, adjust the question by substituting "all segments of the community" with "all members of the household/all key divisions of the organization" if dealing with a household or organization. If dealing with a single individual, check "Yes" by default.

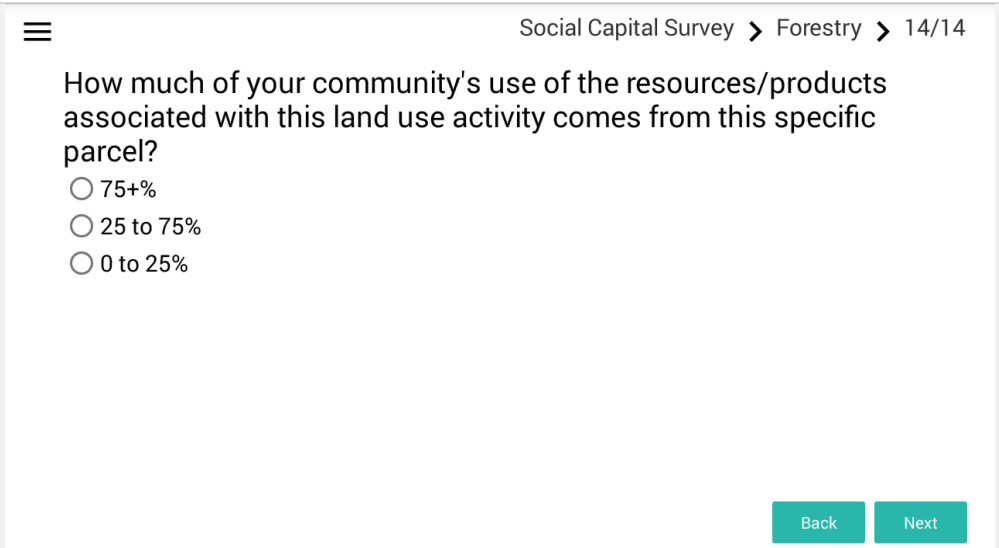






If the parcel is managed as private rather than common land, adjust the question by substituting "committee" with "key decision-maker" if dealing with a household. Can leave as "committee" if organization.

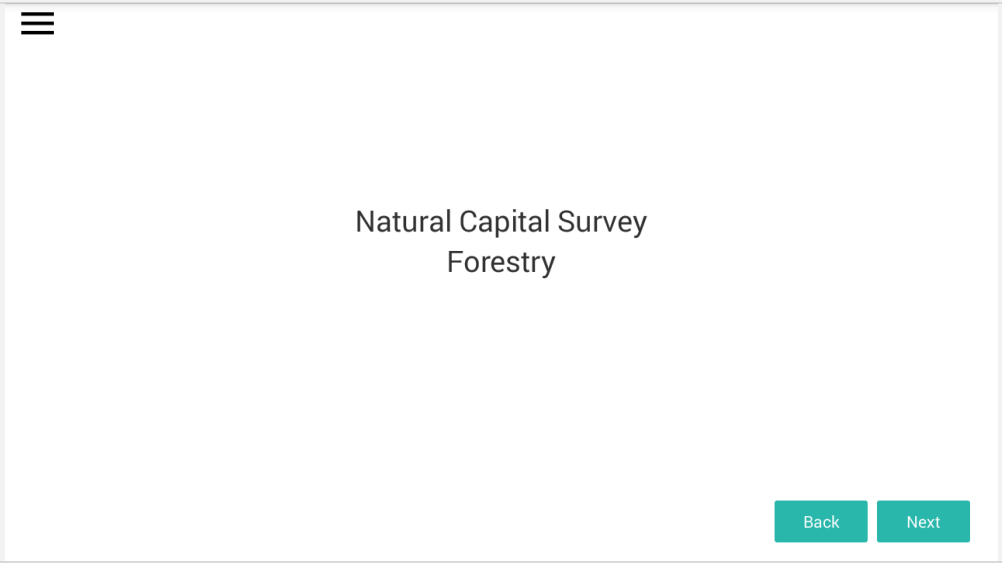
If dealing with a single individual, check "Yes" by default.

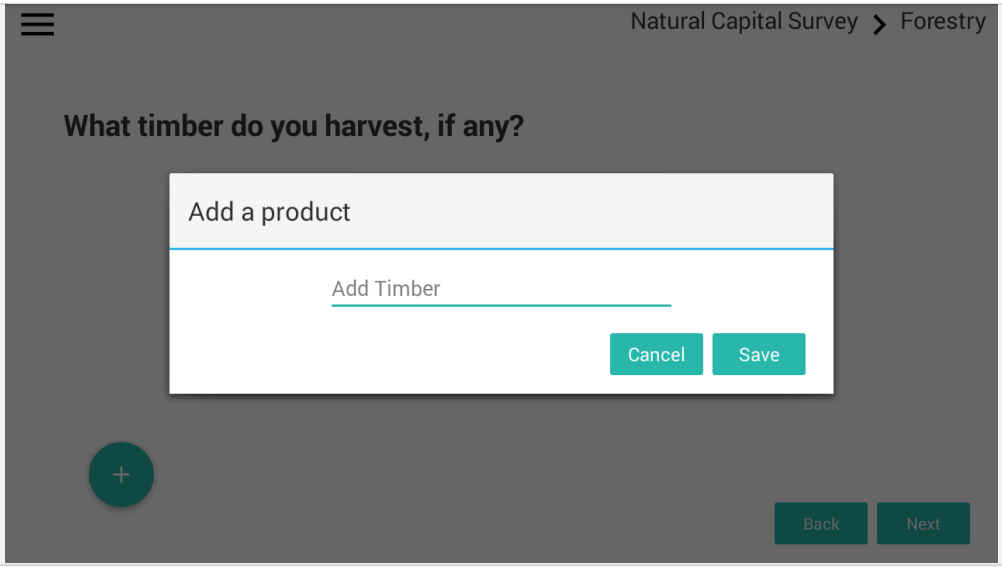


If the parcel is managed as private rather than common land, adjust the question by substituting "your community's" with "your household/organization" or just your" if dealing with an individual.

Natural Capital Survey

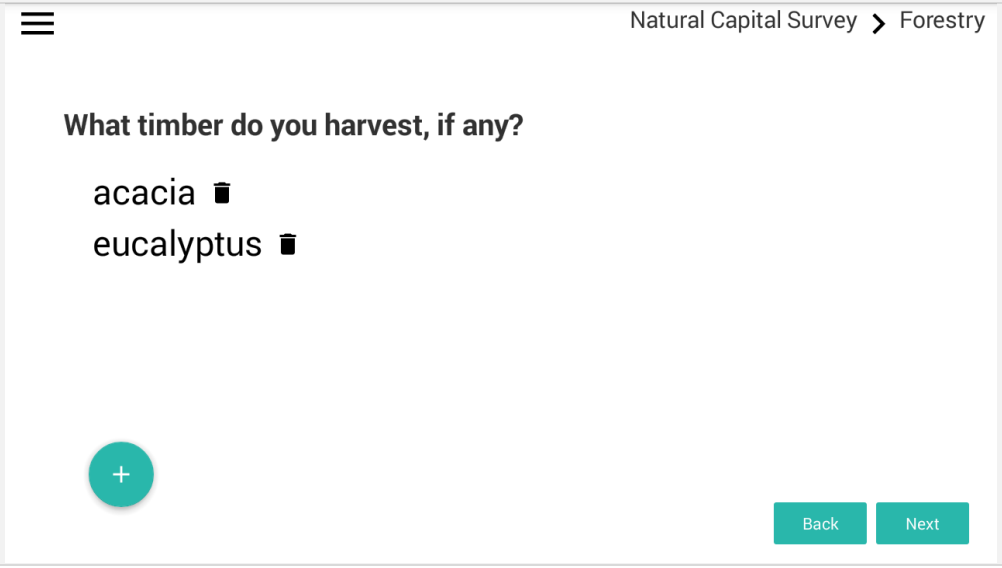
Forestry



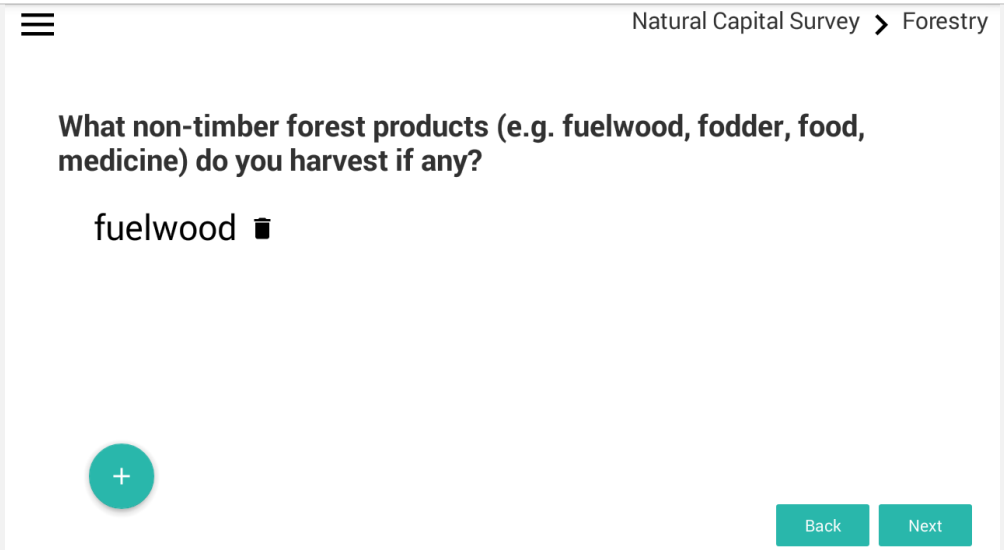


Add all of the names of major timber species harvested from the parcel, one at a time. To add an entry, click the plus sign in the bottom left, which will prompt a new window.

This includes not only timber that is sold on the market but also timber harvested for household use.

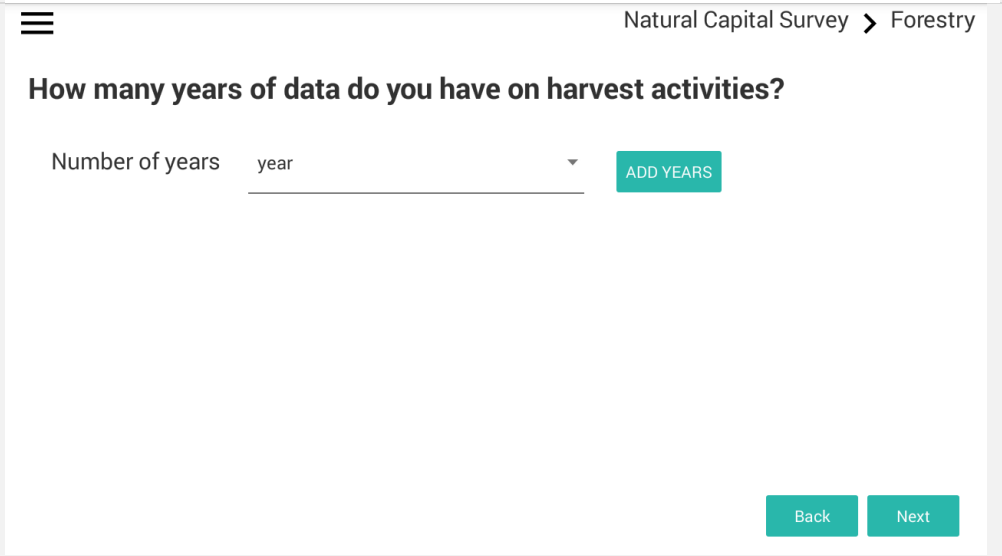


To delete any entries, click the trashcan icon next to the name of the entry.

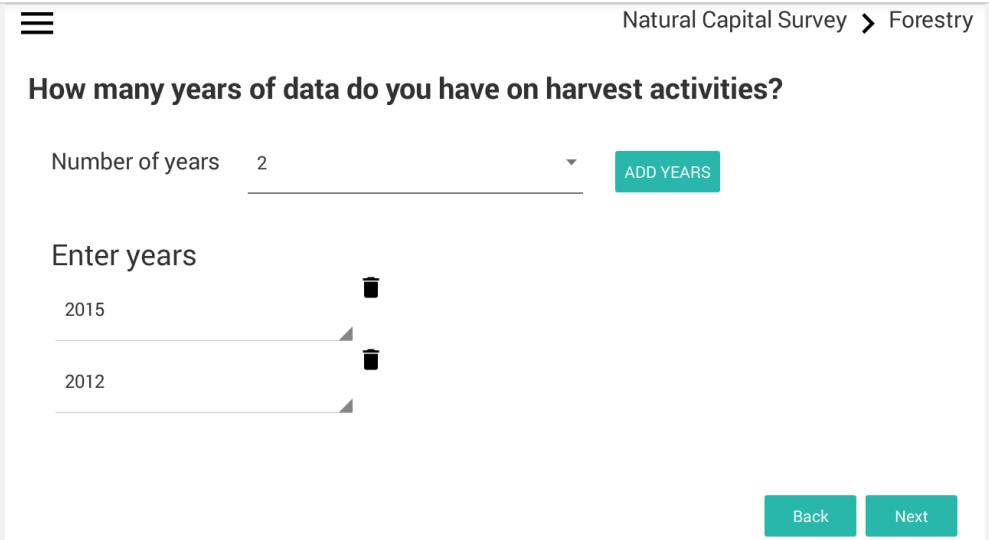


Add names of key nontimber forest products harvested from the parcel, one at a time.

This includes not only products that are sold on the market but also those that are harvested for household use.



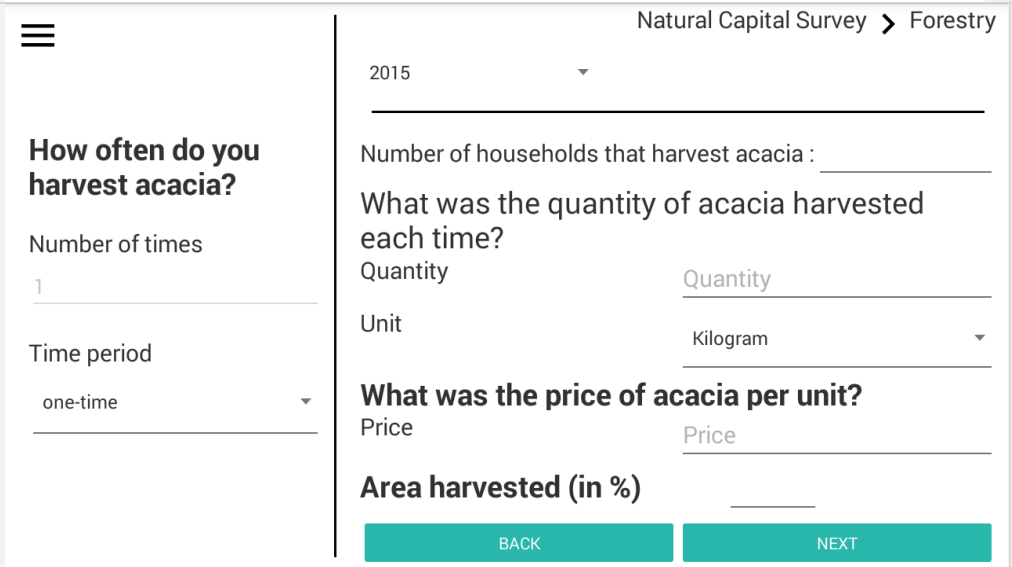
Use the dropdown to indicate the number of years for which you have data on harvest activities for the products you listed earlier. Click ‘Add years’ for the number of years to populate below.



Use the dropdown for each year that appears to select the year for which you have data. The years need not be consecutive. For example, if you only have data for 2011 and 2016, that is fine.

Although it is possible to enter only one year of data, accuracy of projections would be significantly compromised. At the very least try to enter data for two years representing a good year and bad year, or the situation before and after management in the case that a new resource management regime was introduced.

To delete a year, click the trash icon next to the year. To add more years, use the dropdown at the top to indicate the number of years you want to add and click **Add Years** again. The existing years will not be overridden.



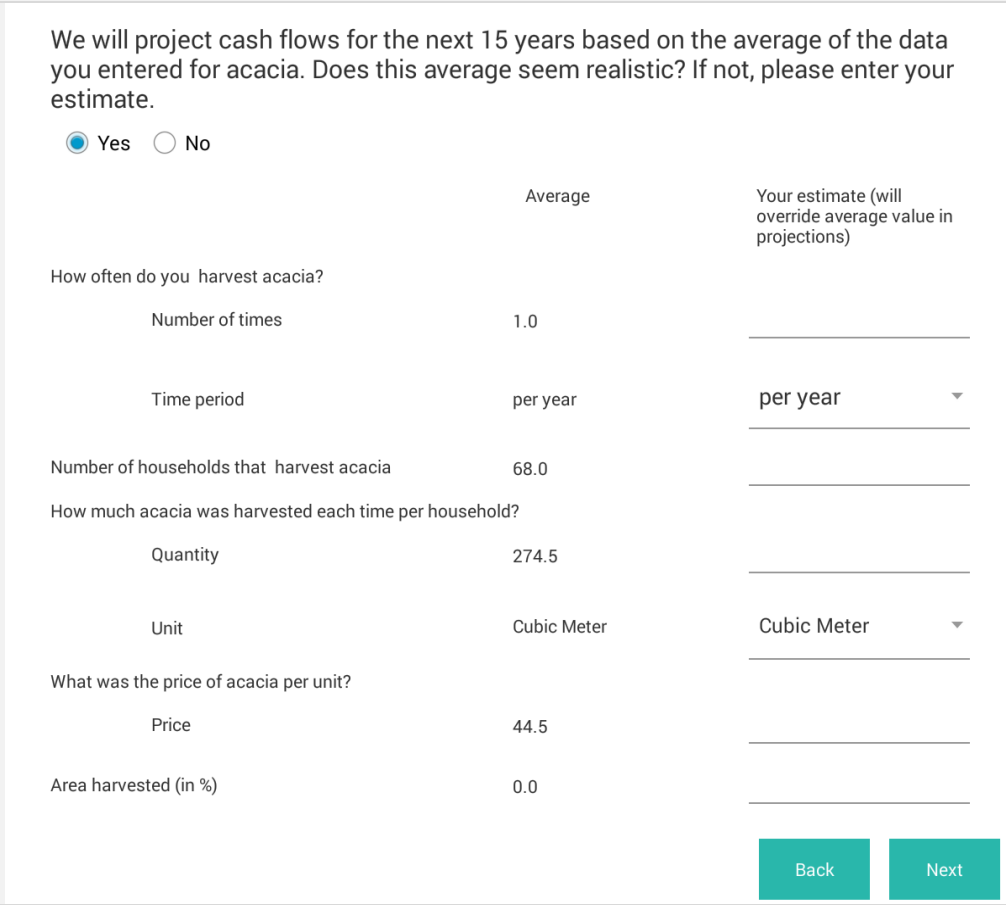
A page will be populated for each product listed, for each year listed.

Use the **time period** dropdown to designate harvest frequency. If there was a major harvest of a product such as timber (e.g. major clear-cut) that is unlikely to be repeated, select "one-time" as the time period. If the frequency is less than once per year, there is no current dropdown option that corresponds to such frequencies. Instead, enter each occurrence of the cost as its own individual "one-time cost." For instance, if maintenance is carried out only once every three years, enter one-time entries for the maintenance cost in 2018, 2021, 2024, etc. through the end of the projection period.

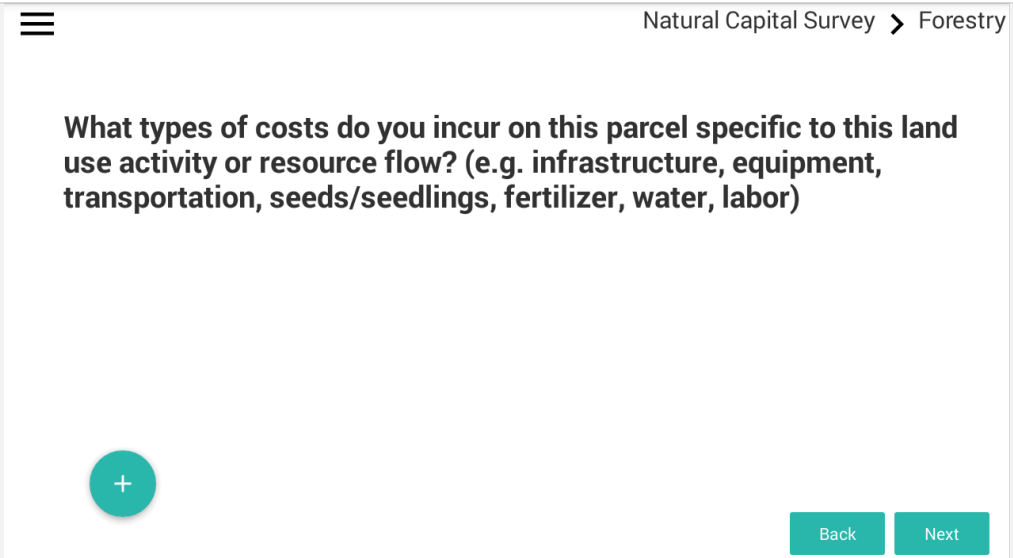
If harvest data is reported per household, enter the number of households, and enter the quantity of product harvested *per household*. If harvest data is reported as a total across all households, enter "1" for the number of households, and enter the total quantity harvested across all households.

The price unit is assumed to be in the same currency as originally entered when signing up.

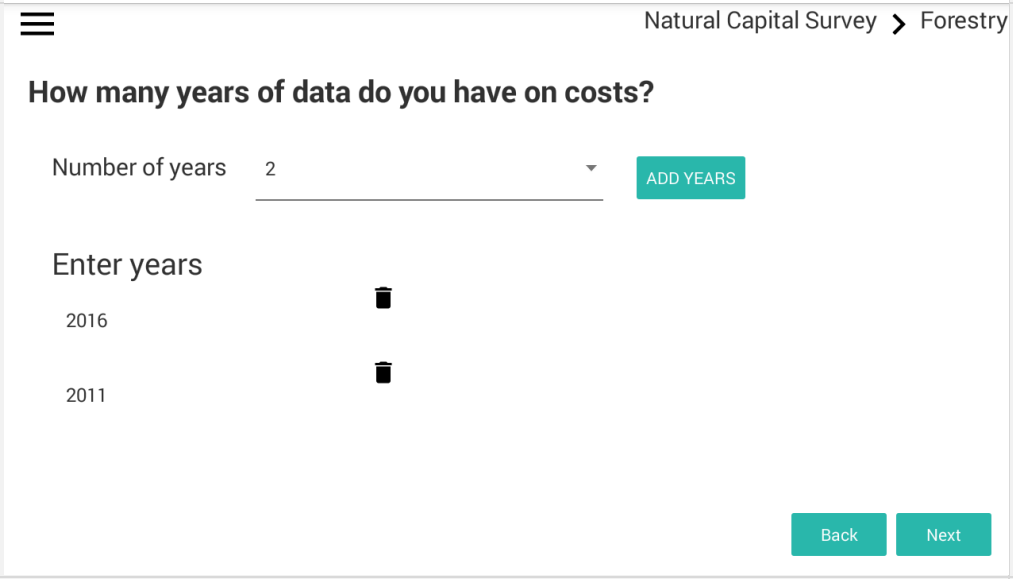
The % area harvested is optional, intended to give an indication of how much of the total harvest stock is harvested each time – only a rough proxy because it does not consider intensity of harvest. For example, 100% of an area could be harvested for timber but only be thinned rather than clear-cut.



The valuation will by default take an average of the data you entered for each particular product across all years. In some cases, the average may not be realistic. For example, the user may be aware of a downward or upward trend into the future that is not captured by simply taking an average. In such a case, select "No" and provide more realistic assumptions to be projected across the next 15 years.



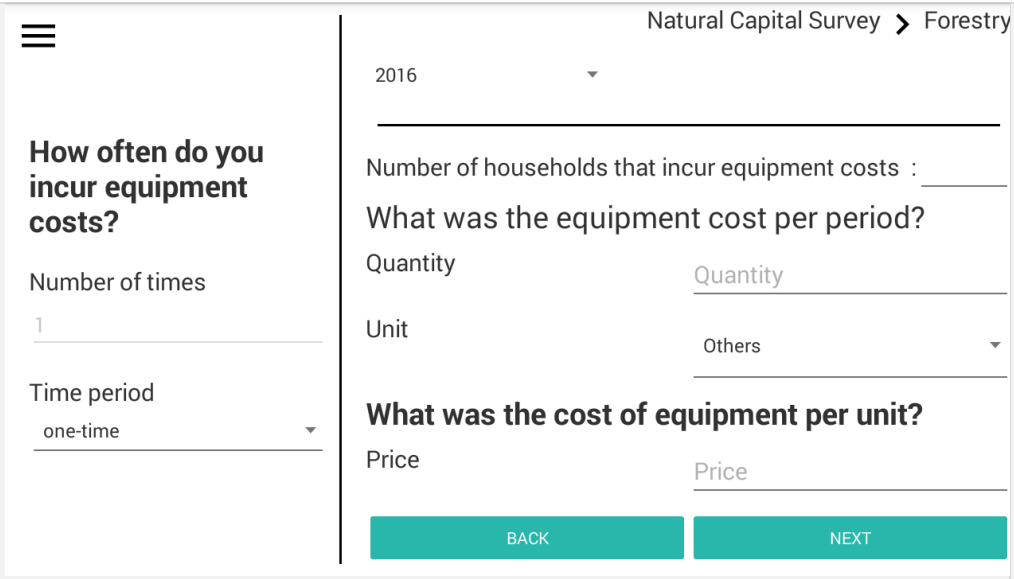
Add names of key costs incurred on the parcel specific to the specified land use activity or resource flow. Do not include costs associated with other activities or resource flows, there will be a section at the end where it is possible to input any more general shared costs incurred on the parcel that are not unique to this land use activity or resource flow.



Use the dropdown for each year that appears to select the year for which you have data. The years need not be consecutive. For example, if you only have data for 2011 and 2016, that is fine.

Although it is possible to enter only one year of data, accuracy of projections would be significantly compromised. At the very least try to enter data for two years representing a good year and bad year, or the situation before and after management in the case that a new resource management regime was introduced.

To delete a year, click the trash icon next to the year. To add more years, use the dropdown at the top to indicate the number of years you want to add and click **Add Years** again. The existing years will not be overridden.

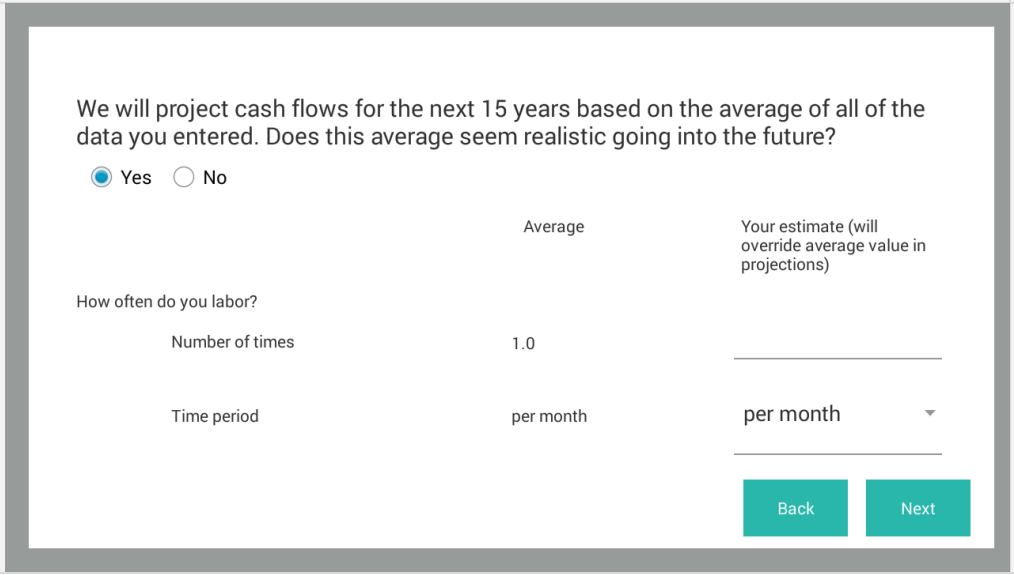


A page will be populated for each cost listed, for each year listed.

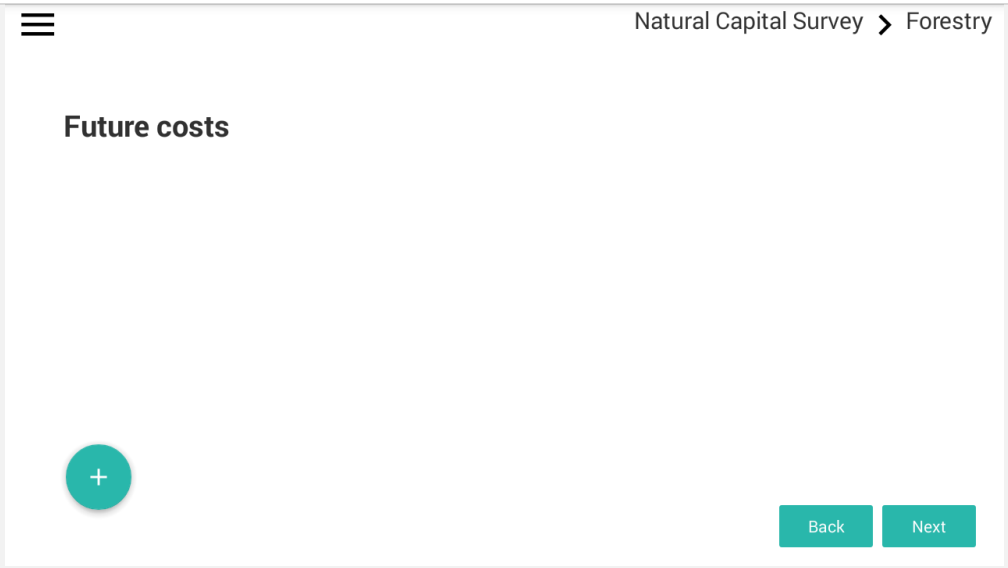
Use the **time period** dropdown to designate cost frequency. If there was a major one-time cost that is unlikely be repeated, select "one-time" as the time period. If the frequency is less than once per year, enter the appropriate fraction of a year. For instance, if maintenance is carried out only once every two years, select "per year" and enter "0.5." For greater precision, enter directly into the self-filling version of the Excel spreadsheet where it is possible to put in the precise values in specific years rather than a fraction each year.

If cost data is reported per household, enter the number of households, and enter the cost incurred *per household*. If cost data is reported as a total across all households, enter "1" for the number of households, and enter the total cost incurred across all households.

The price unit is assumed to be in the same currency as originally entered when signing up.



The valuation will by default take an average of the data you entered for each particular cost across all years. In some cases, the average may not be realistic. For example, the user may be aware of a downward or upward trend into the future that is not captured by simply taking an average. In such a case, select "No" and provide more realistic assumptions to be projected across the next 15 years.

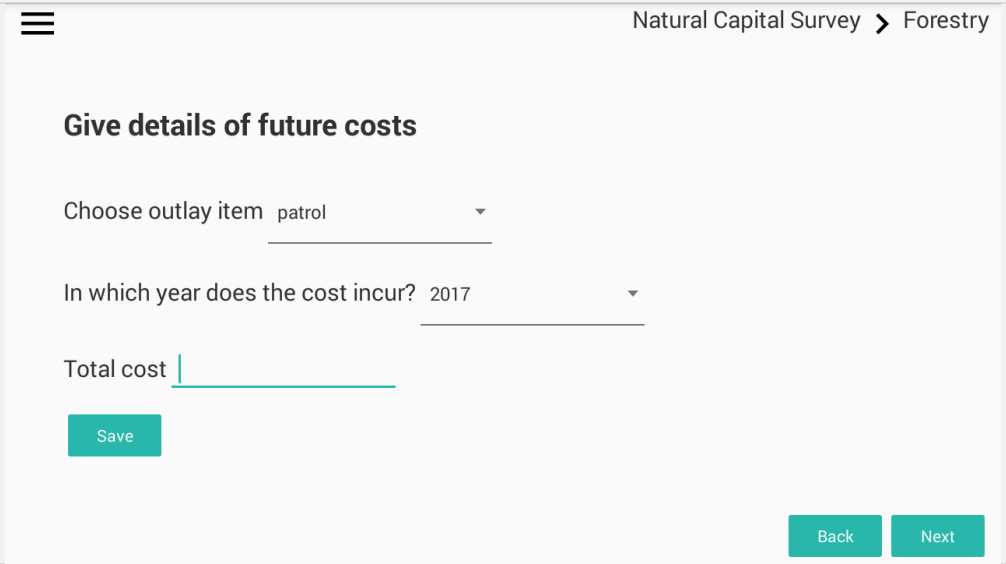


Add names of key additional future costs to be incurred on the parcel specific to the specified land use activity or resource flow, for example, investment in certain harvesting equipment.

This tablet-based survey allows users to input assumptions about future costs. For future benefits associated with products that are already harvested, the user can override the projection assumptions in the historical data section to include estimated increases going forward.

For new types of future benefits (e.g. a new type of nontimber forest product), the user will need to enter it in the earlier section on harvested products, insert 0 across all items in historical data, then override the assumptions in the projections section to include projected benefits going forward. Users can also use the Excel-based version to explore scenarios for future investments, as the Excel model has more flexibility relative to the app to accommodate data on both new future costs and benefits.

Do not enter any existing costs that were already entered in historical data. Those will automatically be projected.



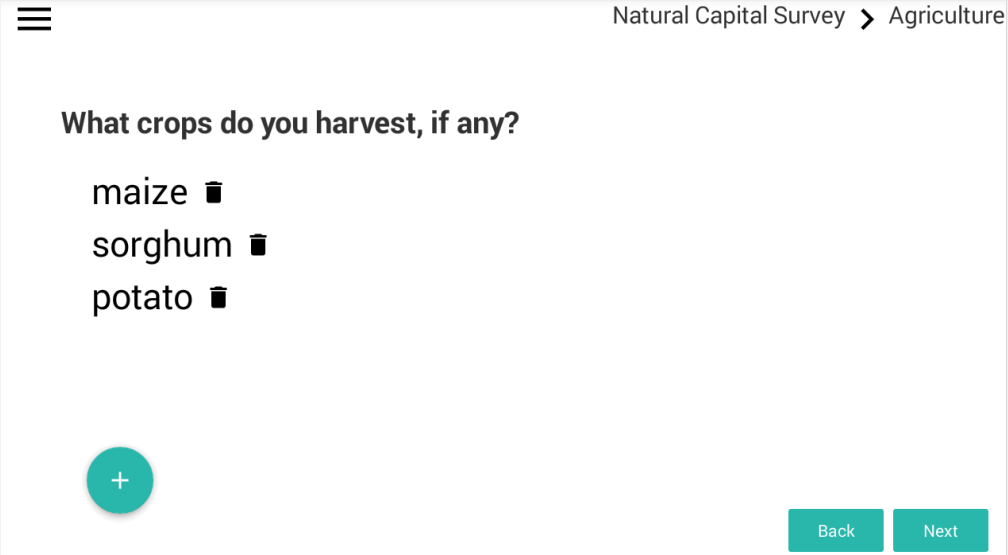
A page will be populated for each future cost listed, for each year listed. Indicate the year in which the cost will first be incurred. It cannot be a previous year.

The amount can currently only be reported as a total, rather than per household.

If it is a recurring new future cost, enter the same cost for the relevant years. There is no way to indicate frequency for future costs in the current version.

The amount is assumed to be in the same currency as originally entered when signing up.

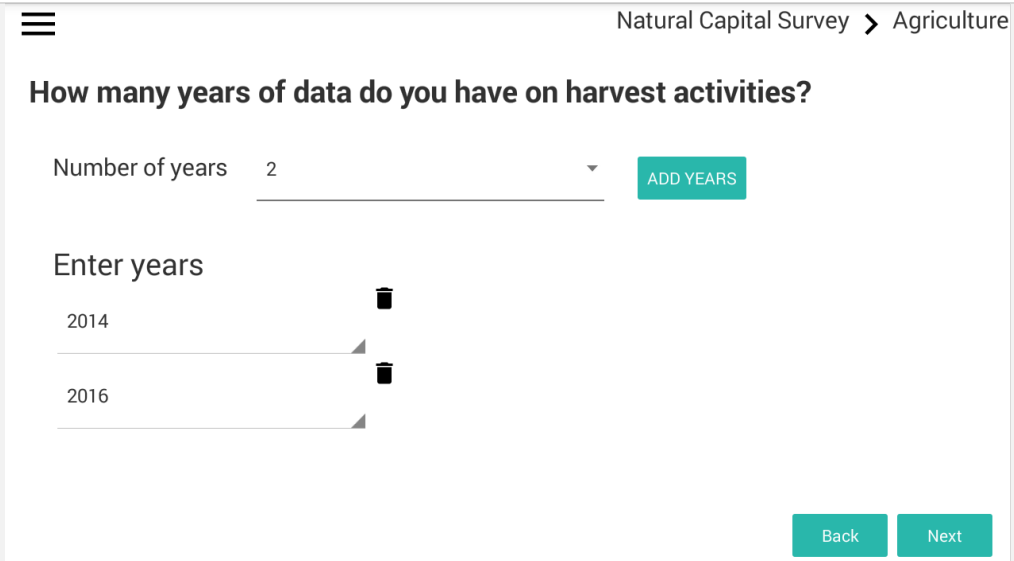
Repeat the social capital and natural capital sections of the survey for agriculture. The social capital questions remain constant. Therefore, only the natural capital section is included below



Add all of the names of major crops harvested from the parcel, one at a time. To add an entry, click the plus sign in the bottom left, which will prompt a new window.

This includes not only crops sold on the market but also crops harvested for household use.

To delete any entries, click the trashcan icon next to the name of the entry.

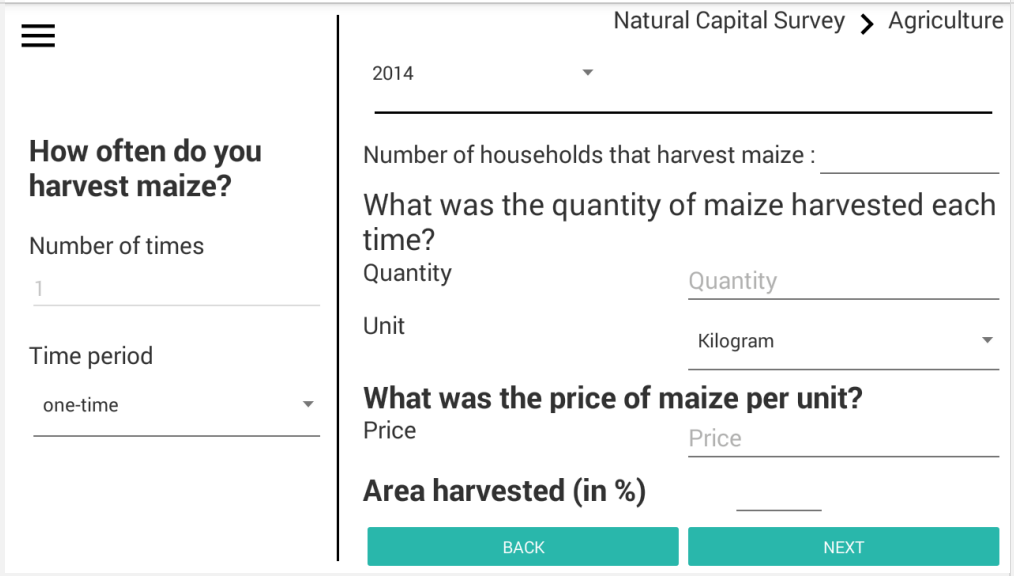


Use the dropdown to indicate the number of years for which you have data on harvest activities for the products you listed earlier. Click 'Add years' for the number of years to populate below.

Use the dropdown for each year that appears to select the year for which you have data. The years need not be consecutive. For example, if you only have data for 2011 and 2016, that is fine.

Although it is possible to enter only one year of data, accuracy of projections would be significantly compromised. At the very least try to enter data for two years representing a good year and bad year, or the situation before and after management in the case that a new resource management regime was introduced.

To delete a year, click the trash icon next to the year. To add more years, use the dropdown at the top to indicate the number of years you want to add and click **Add Years** again. The existing years will not be overridden.

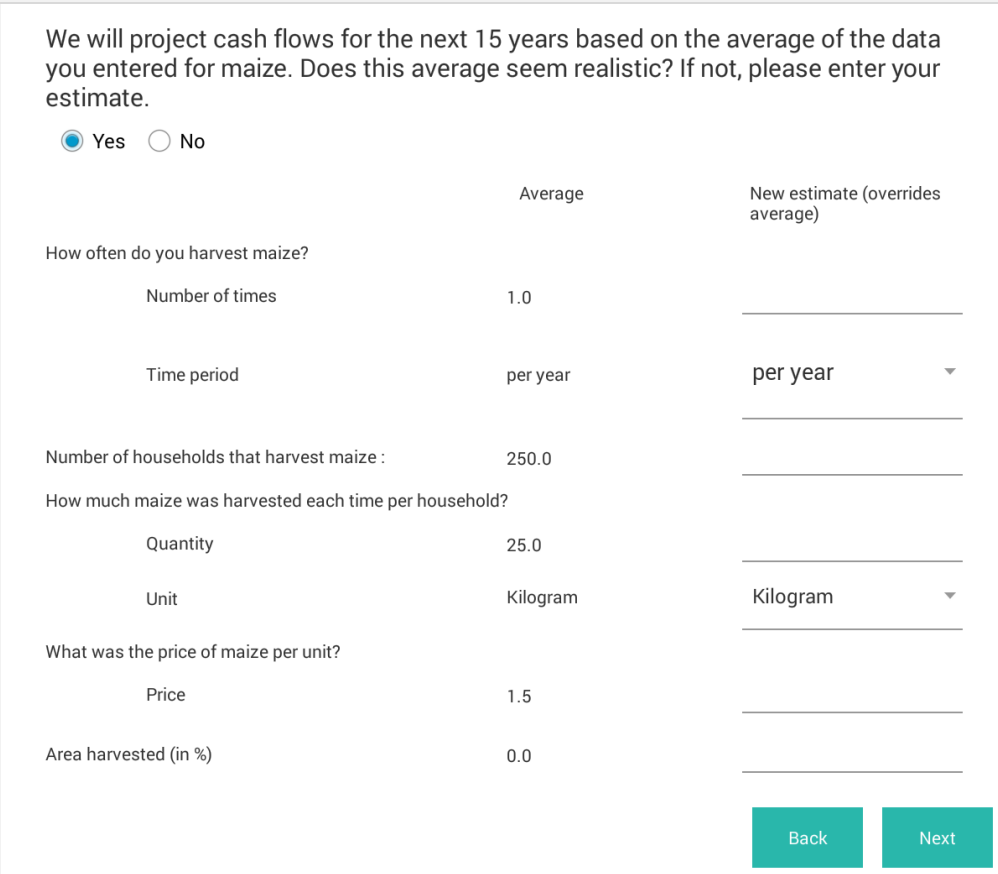


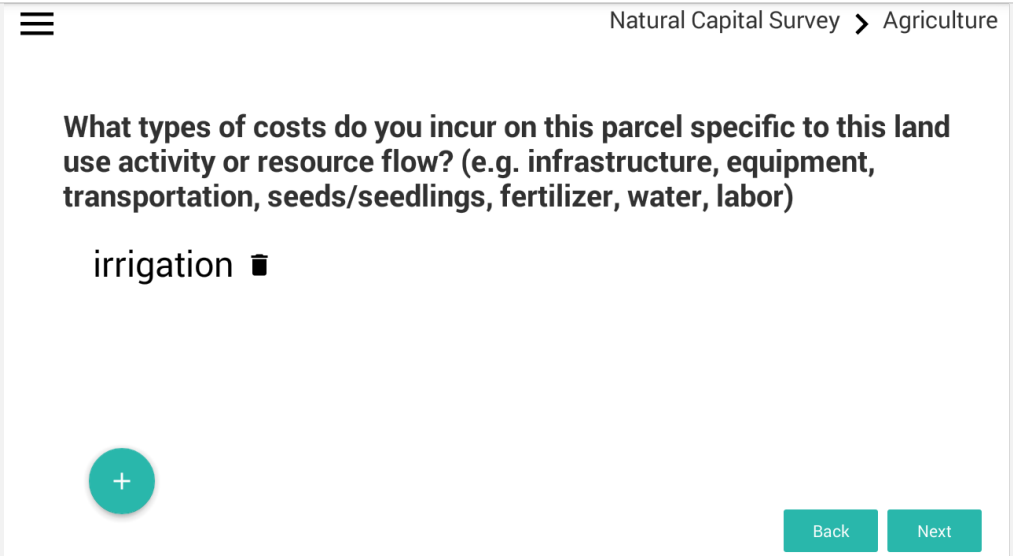
A page will be populated for each product listed, for each year listed.

Use the **time period** dropdown to designate harvest frequency. If there was a major harvest of a product that is unlikely to be repeated, select "one-time" as the time period. If the frequency is less than once per year, there is no current dropdown option that corresponds to such frequencies. Instead, enter each occurrence of the cost as its own individual "one-time cost." For instance, if maintenance is carried out only once every three years, enter one-time entries for the maintenance cost in 2018, 2021, 2024, etc. through the end of the projection period.

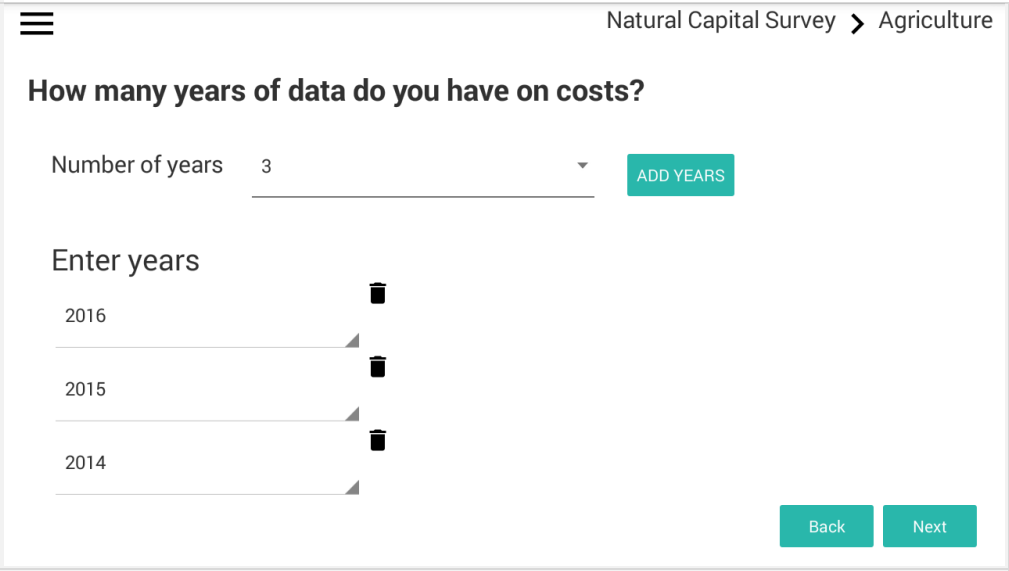
If harvest data is reported per household, enter the number of households, and enter the quantity of product harvested *per household*. If harvest data is reported as a total across all households, enter "1" for the number of households, and enter the total quantity harvested across all households.

The price unit is assumed to be in the same currency as originally entered when signing up.

	The % area harvested is optional, intended to give an indication of how much of the total harvest stock is harvested each time – only a rough proxy because it does not consider intensity of harvest.
	The valuation will by default take an average of the data you entered for each particular product across all years. In some cases, the average may not be realistic. For example, the user may be aware of a downward or upward trend into the future that is not captured by simply taking an average. In such a case, select "No" and provide more realistic assumptions to be projected across the next 15 years.



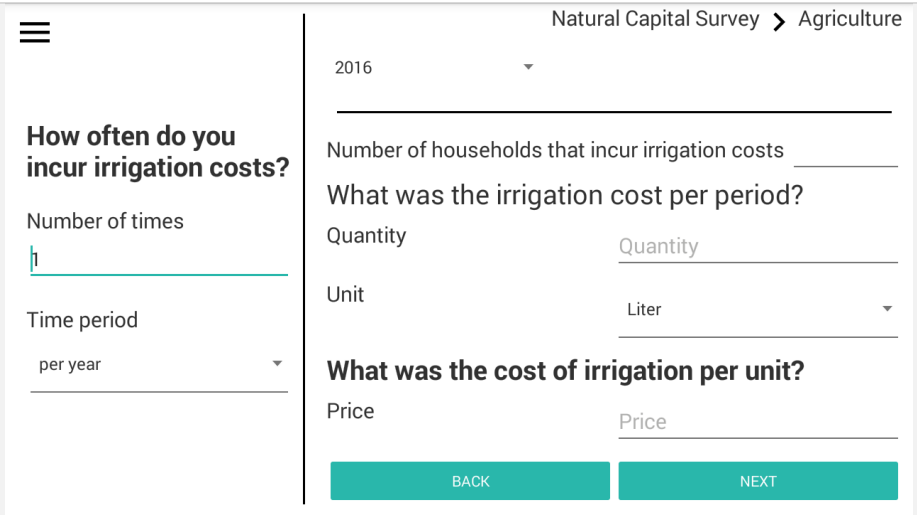
Add names of key costs incurred on the parcel specific to agriculture. Do not include costs associated with other activities or resource flows, there will be a section at the end where it is possible to input any more general shared costs incurred on the parcel that are not unique to this land use activity or resource flow.



Use the dropdown for each year that appears to select the year for which you have data. The years need not be consecutive. For example, if you only have data for 2011 and 2016, that is fine.

Although it is possible to enter only one year of data, accuracy of projections would be significantly compromised. At the very least try to enter data for two years representing a good year and bad year, or the situation before and after management in the case that a new resource management regime was introduced.

To delete a year, click the trash icon next to the year. To add more years, use the dropdown at the top to indicate the number of years you want to add and click **Add Years** again. The existing years will not be overridden.

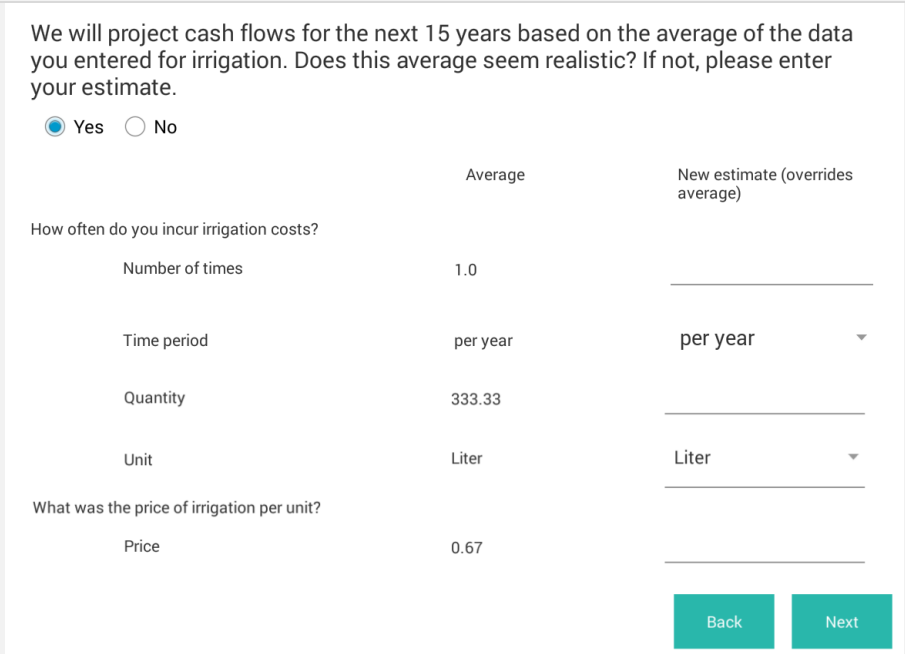


A page will be populated for each cost listed, for each year listed.

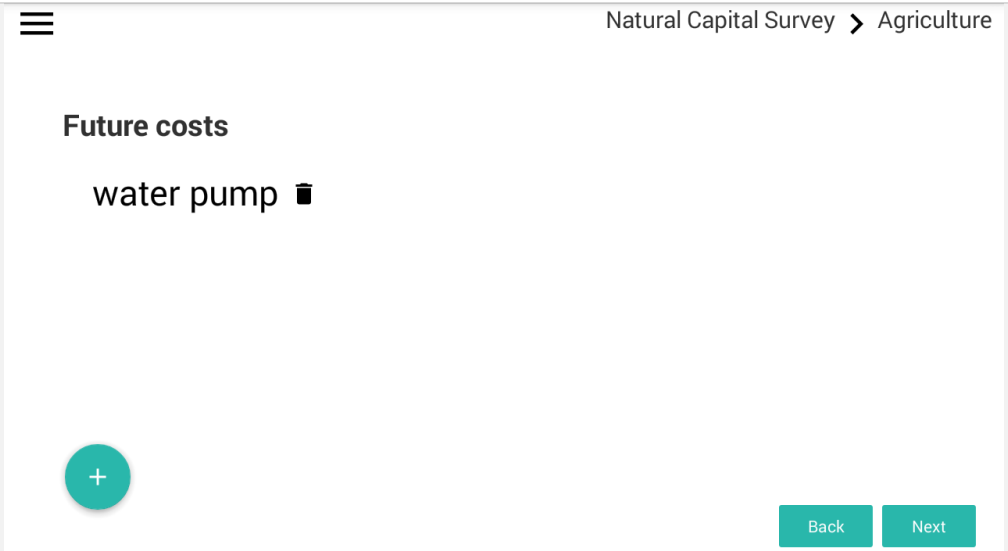
Use the **time period** dropdown to designate cost frequency. If there was a major one-time cost unlikely be repeated, select "one-time" as the time period. If the frequency is less than once per year, enter the appropriate fraction of a year. For instance, if maintenance is carried out only once every two years, select "per year" and enter "0.5." For more precision, enter directly into the Excel spreadsheet where it is possible to put in the precise values in specific years rather than a fraction each year.

If cost data is reported per household, enter the number of households, and enter the cost incurred *per household*. If cost data is reported as a total across all households, enter "1" for number of households, and enter total cost incurred across all households.

The price unit the same currency as entered when signing up.



The valuation will by default take an average of the data you entered for each particular cost across all years. In some cases, the average may not be realistic. For example, the user may be aware of a downward or upward trend into the future that is not captured by simply taking an average. In such a case, select "No" and provide more realistic assumptions to be projected across the next 15 years.

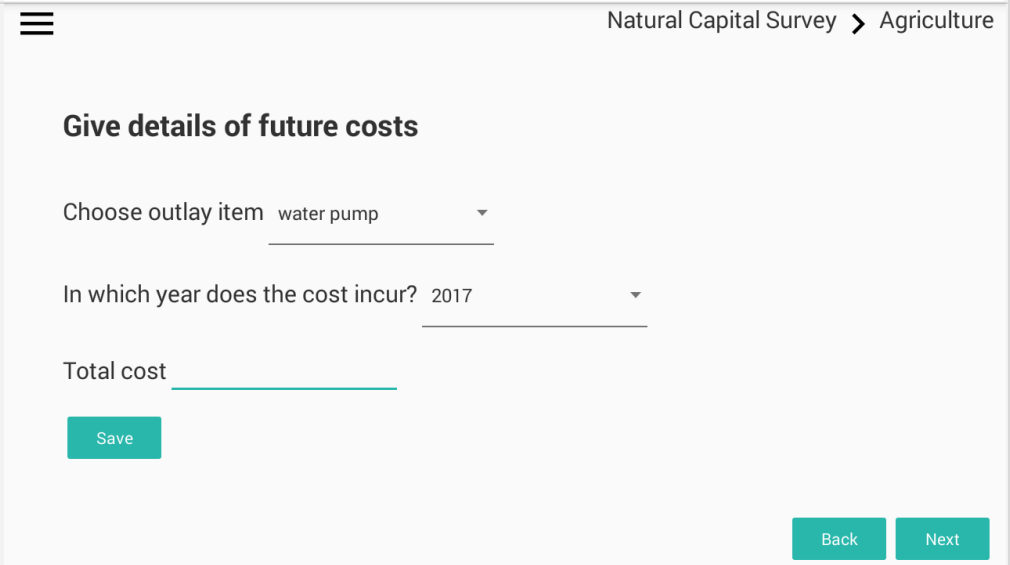


A page will be populated for each future cost listed, for each year listed. Indicate the year in which the cost will first be incurred. It cannot be a previous year.

The amount can currently only be reported as a total, rather than per household.

If it is a recurring new future cost, enter the same cost for the relevant years. There is no way to indicate frequency for future costs in the current version.

The amount is assumed to be in the same currency as originally entered when signing up.



A page will be populated for each future cost listed, for each year listed.

Indicate the year in which the cost will first be incurred. It cannot be a previous year.

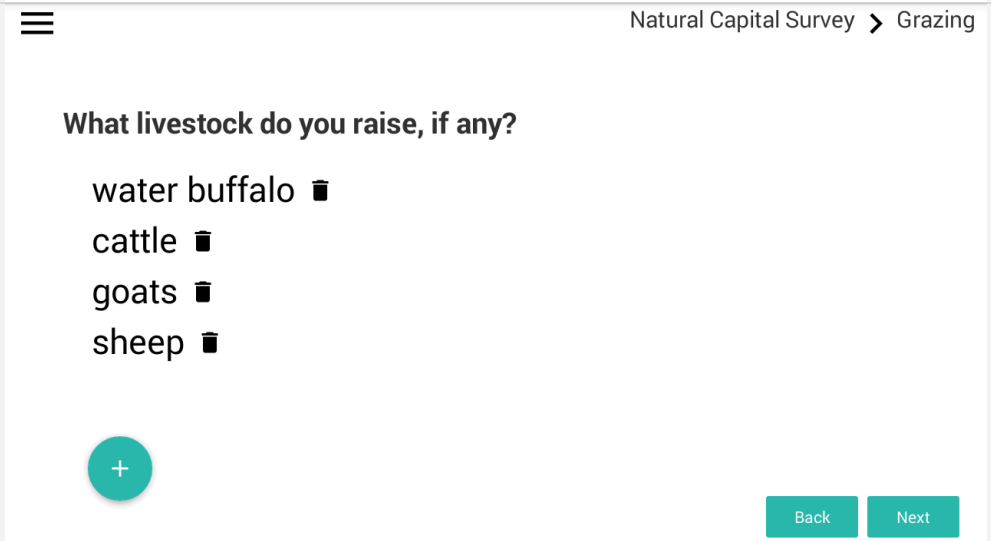
The amount can currently only be reported as a total, rather than per household.

If the frequency is less than once per year, enter the appropriate fraction of a year. For instance, if maintenance is carried out only once every two years, select “per year” and enter “0.5.” For greater precision, enter directly into the self-filling version of the Excel spreadsheet where it is possible to put in the precise values in specific years rather than a fraction each year.

The amount is assumed to be in the same currency as originally entered when signing up.

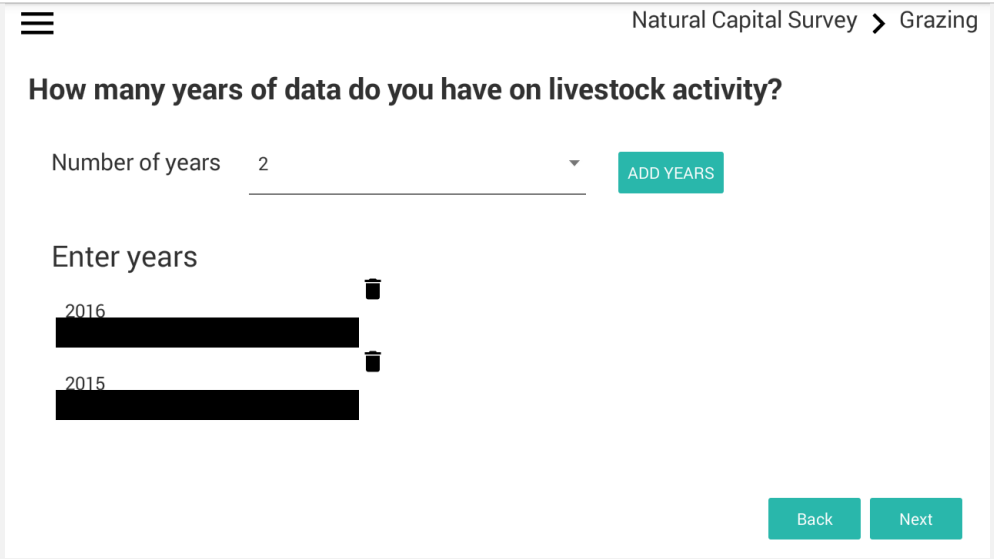
Grazing

Repeat the social capital and natural capital sections of the survey for grazing. The social capital questions remain constant. Therefore, only the natural capital section is included below.



Add all of the names of major livestock that graze on the parcel, one at a time. To add an entry, click the plus sign in the bottom left, which will prompt a new window.

To delete any entries, click the trashcan icon next to the name of the entry.

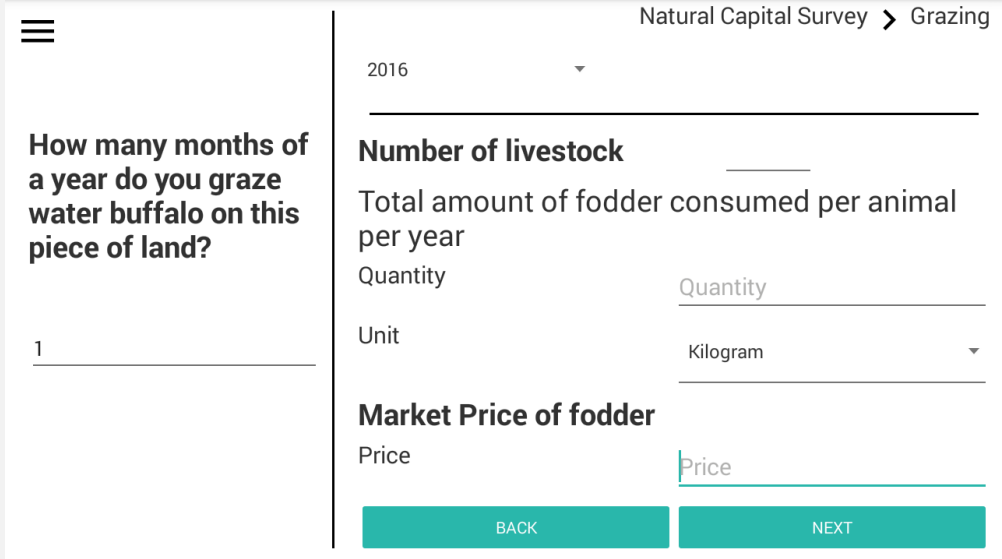


Use the dropdown to indicate the number of years for which you have data on consumption of fodder for the livestock types you listed earlier. Click 'Add years' for the number of years to populate below.

Use the dropdown for each year that appears to select the year for which you have data. The years need not be consecutive. For example, if you only have data for 2011 and 2016, that is fine.

Although it is possible to enter only one year of data, accuracy of projections would be significantly compromised. At the very least try to enter data for two years representing a good year and bad year, or the situation before and after management in the case that a new resource management regime was introduced.

To delete a year, click the trash icon next to the year. To add more years, use the dropdown at the top to indicate the number of years you want to add and click **Add Years** again. The existing years will not be overridden.



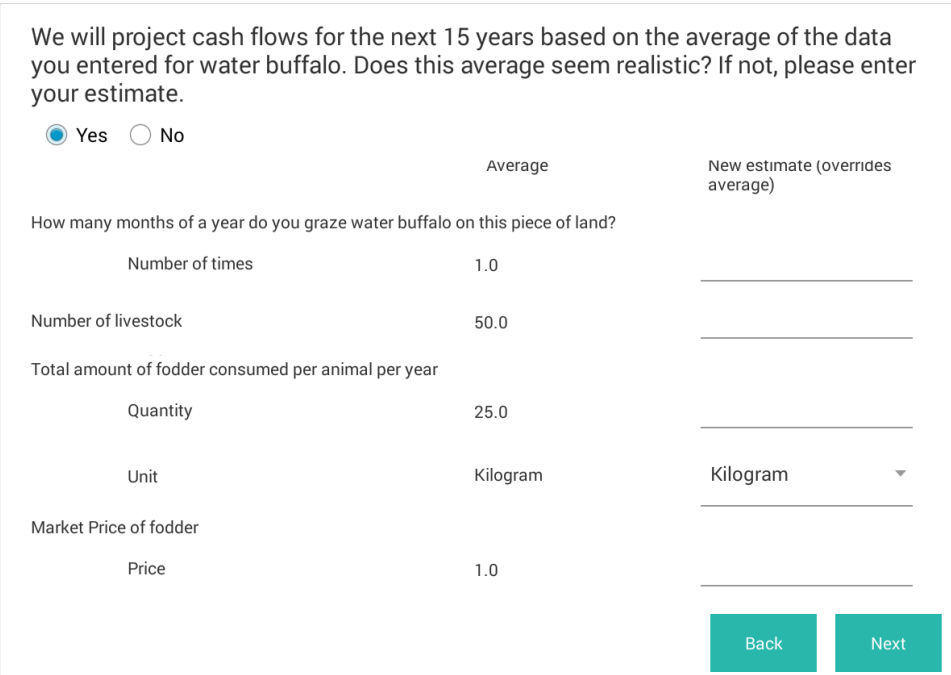
A page will be populated for each livestock type listed, for each year listed. Indicate the average number of months a year that each livestock type spends grazing on the land.

In the app, if the grazing frequency is less than one month or once per year, enter the appropriate fraction of a year. For instance, if grazing happens only one month every two years, select "0.5." For greater precision, enter directly into the self-filling version of the Excel spreadsheet where it is possible to put in the precise values in specific years rather than a fraction each year.

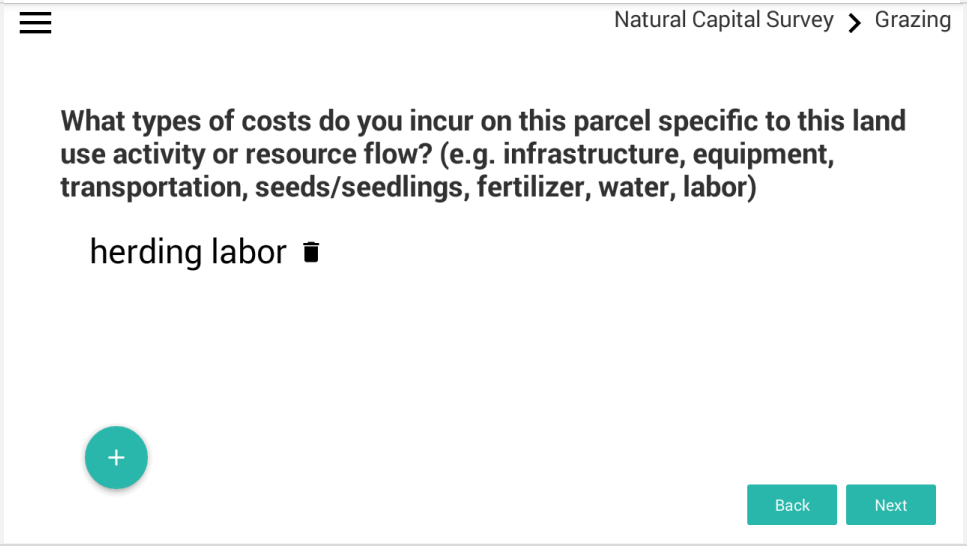
If grazing data is reported per household, multiply the number of households by the average number of livestock per household.

Verify that people are reporting harvest volume/weight of fodder and price of fodder based on the same units.

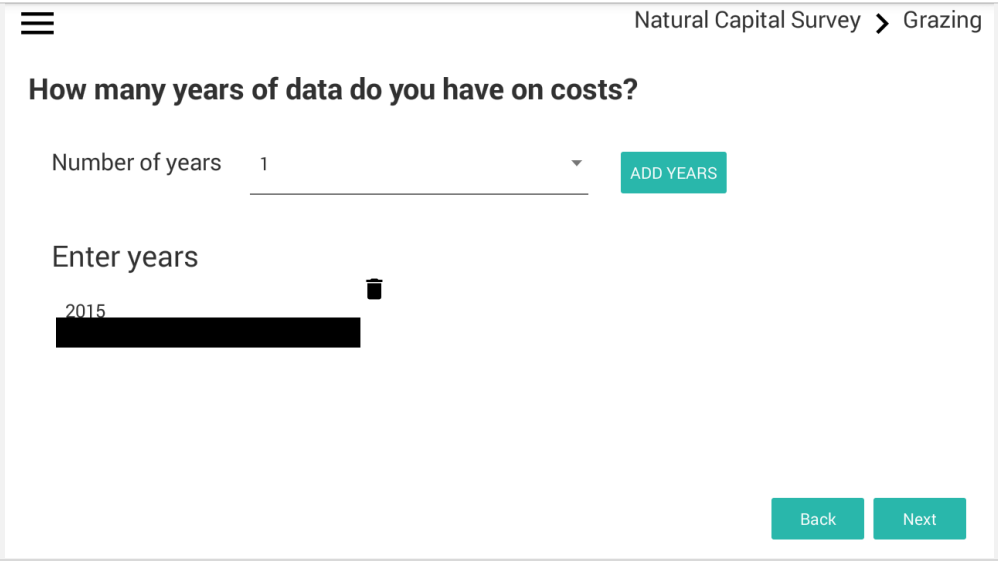
In the case that the land parcel is used by many people and people have differing answers, try to obtain an average from the discussion.



The valuation will by default take an average of the data you entered for each particular livestock across all years. In some cases, the average may not be realistic. For example, the user may be aware of a downward or upward trend into the future that is not captured by simply taking an average. In such a case, select "No" and provide more realistic assumptions to be projected across the next 15 years.



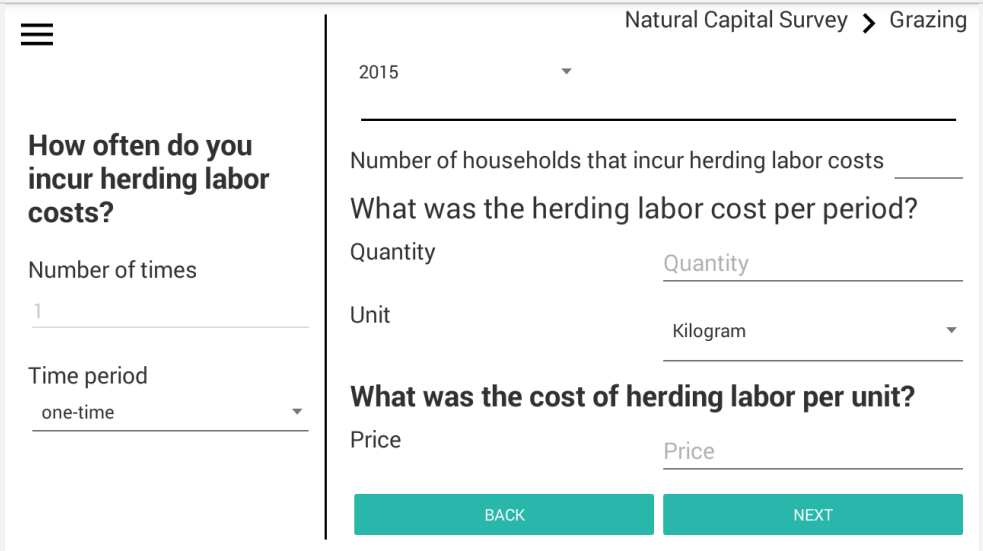
Add names of key costs incurred on the parcel specific to grazing. Do not include costs associated with other activities or resource flows, there will be a section at the end where it is possible to input any more general shared costs incurred on the parcel that are not unique to this land use activity or resource flow.



Use the dropdown for each year that appears to select the year for which you have data. The years need not be consecutive. For example, if you only have data for 2011 and 2016, that is fine.

Although it is possible to enter only one year of data, accuracy of projections would be significantly compromised. At the very least try to enter data for two years representing a good year and bad year, or the situation before and after management in the case that a new resource management regime was introduced.

To delete a year, click the trash icon next to the year. To add more years, use the dropdown at the top to indicate the number of years you want to add and click **Add Years** again. The existing years will not be overridden.

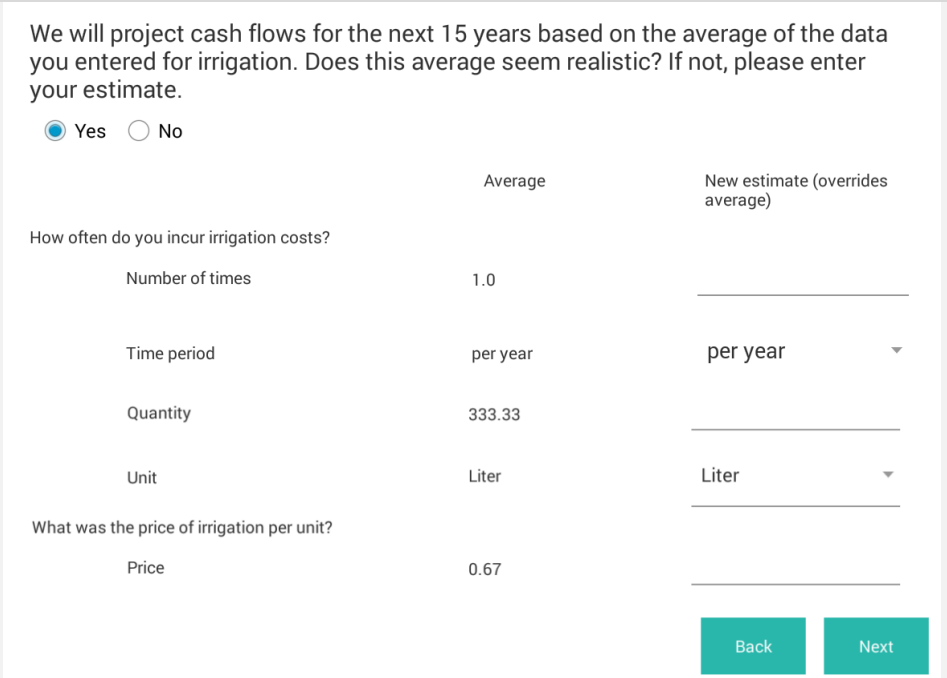


A page will be populated for each cost listed, for each year listed.

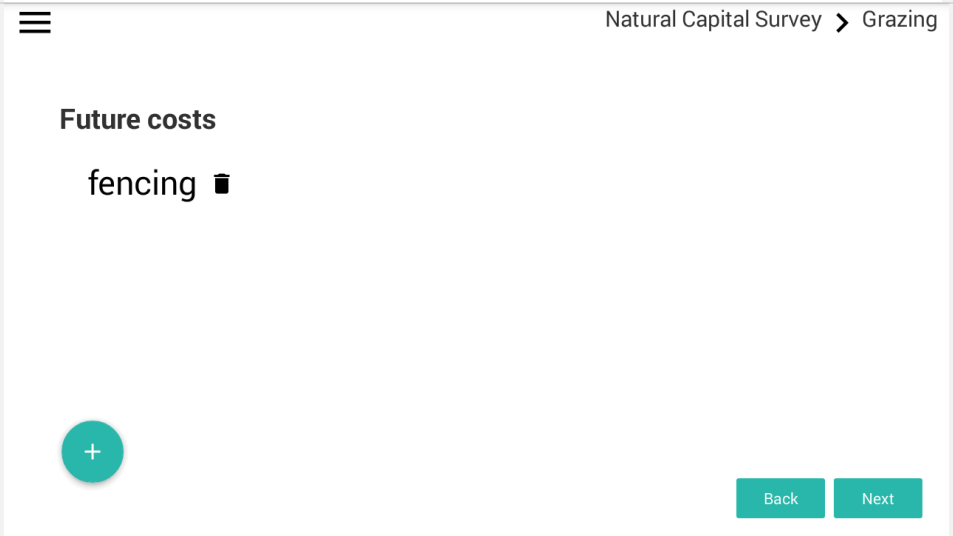
Use the **time period** dropdown to designate cost frequency. If there was a major one-time cost that is unlikely be repeated, select "one-time" as the time period. If the frequency is less than once per year, enter the appropriate fraction of a year. For instance, if maintenance is carried out only once every two years, select "per year" and enter "0.5." For greater precision, enter directly into the self-filling version of the Excel spreadsheet where it is possible to put in the precise values in specific years rather than a fraction each year.

If cost data is reported per household, enter the number of households, and enter the cost incurred *per household*. If cost data is reported as a total across all households, enter "1" for the number of households, and enter the total cost incurred across all households.

The price unit is assumed to be in the same currency as originally entered when signing up.



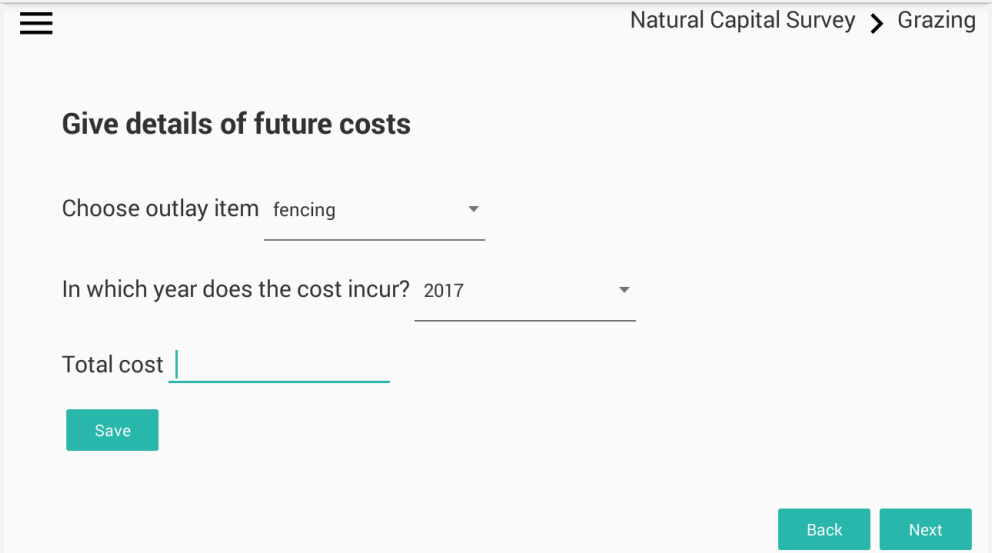
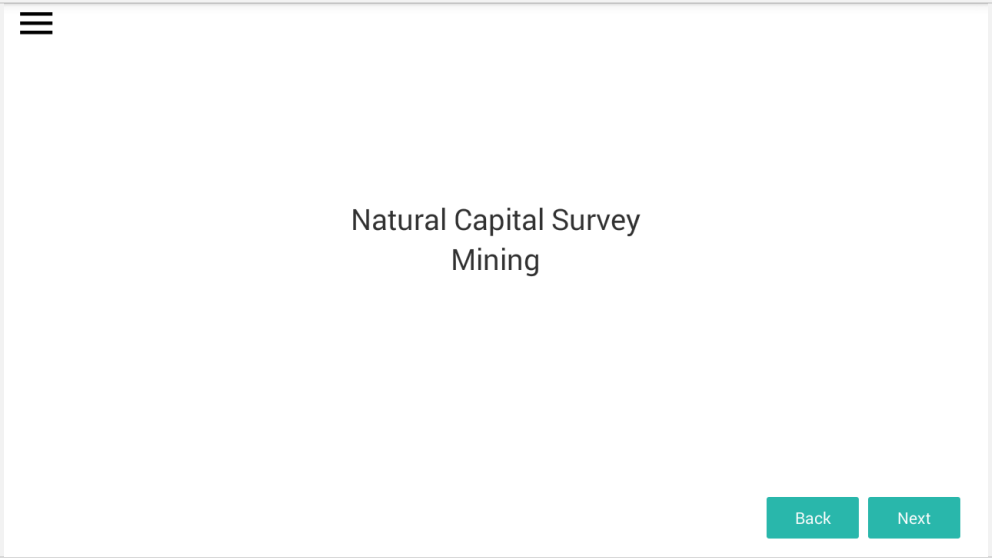
The valuation will by default take an average of the data you entered for each particular cost across all years. In some cases, the average may not be realistic. For example, the user may be aware of a downward or upward trend into the future that is not captured by simply taking an average. In such a case, select "No" and provide more realistic assumptions to be projected across the next 15 years.

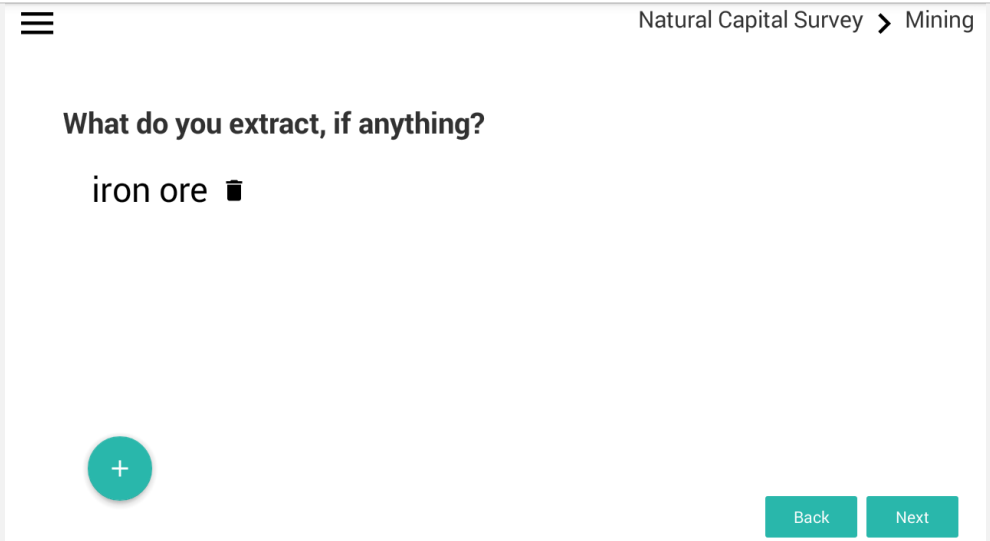


Add names of key additional future costs to be incurred on the parcel specific to grazing, for example, investment in the form of seeding new fodder varieties.

This tablet-based version of the survey allows the user to input assumptions about future costs. For future benefits associated with products that are already being harvested, the user can override the projection assumptions in the historical grazing data section to include estimated increases going forward.

For new types of future benefits (e.g. a new type of fodder), the user will need to enter it in the earlier section on harvested products, insert 0 across all items in historical data, then override the assumptions in the projections section to include projected benefits going forward. Users can also use the Excel-based version to explore scenarios for future investments, as the Excel model has more flexibility relative to the app to accommodate data on both new future costs and benefits.

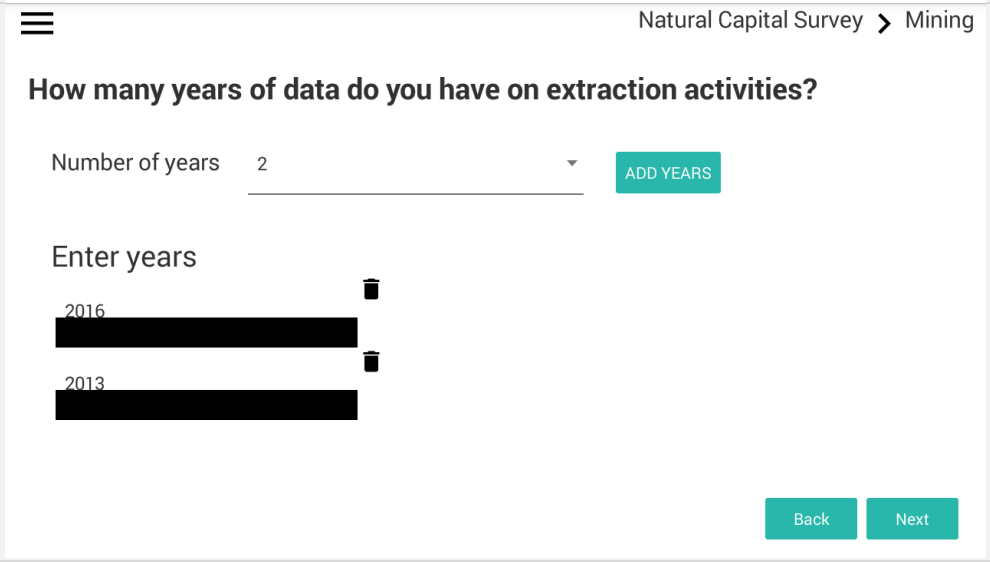
	Do not enter any existing costs that were already entered as part of historical data. Those will automatically be projected forward.
	A page will be populated for each future cost listed, for each year listed. Indicate the year in which the cost will first be incurred. It cannot be a previous year. The amount can currently only be reported as a total, rather than per household. If it is a recurring new future cost, enter the same cost for the relevant years. There is no way to indicate frequency for future costs in the current version. The amount is assumed to be in the same currency as originally entered when signing up.
Mining	
	Repeat the social capital and natural capital sections of the survey for mining. The social capital questions remain constant. Therefore, only the natural capital section is included below.



Add all of the names of major timber species harvested from the parcel, one at a time. To add an entry, click the plus sign in the bottom left, which will prompt a new window.

This includes not only timber that is sold on the market but also timber harvested for household use.

To delete any entries, click the trashcan icon next to the name of the entry.

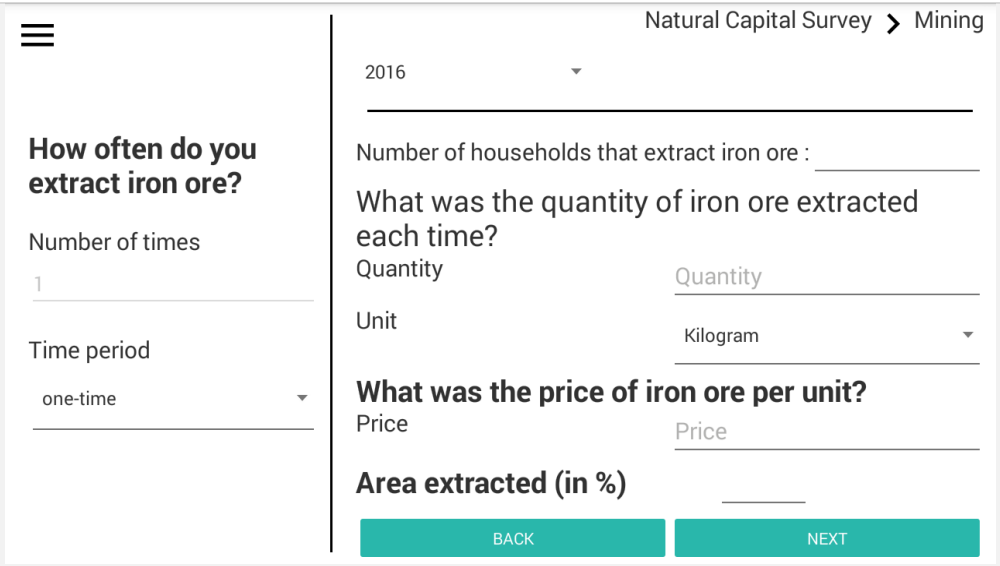


Use the dropdown to indicate the number of years for which you have data on harvest activities for the products you listed earlier. Click 'Add years' for the number of years to populate below.

Use the dropdown for each year that appears to select the year for which you have data. The years need not be consecutive. For example, if you only have data for 2011 and 2016, that is fine.

Although it is possible to enter only one year of data, accuracy of projections would be significantly compromised. At the very least try to enter data for two years representing a good year and bad year, or the situation before and after management in the case that a new resource management regime was introduced.

To delete a year, click the trash icon next to the year. To add more years, use the dropdown at the top to indicate the number of years you want to add and click **Add Years** again. The existing years will not be overridden.



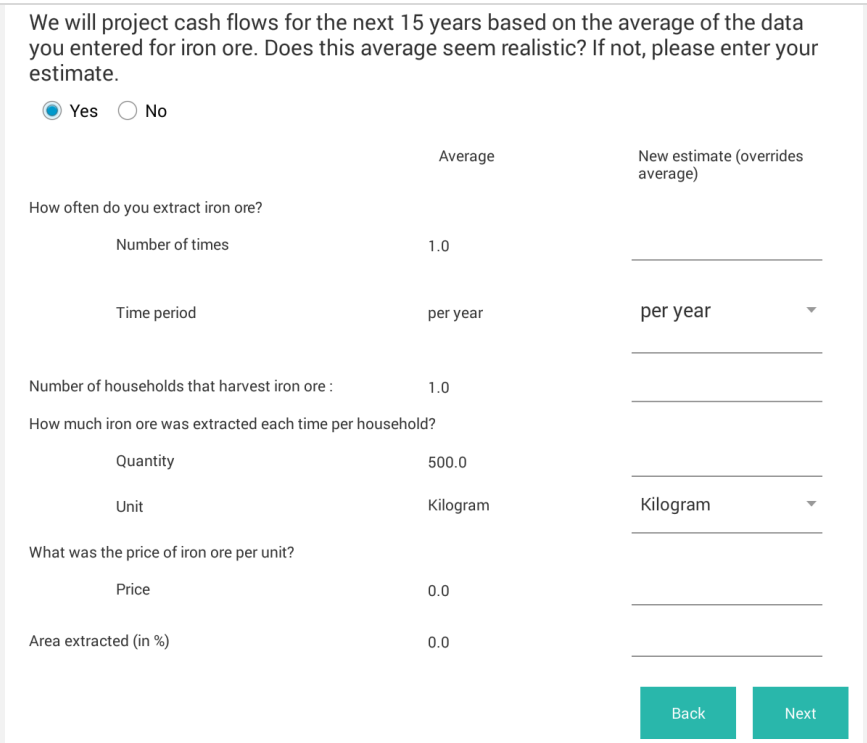
A page will be populated for each product listed, for each year listed.

Use the **time period** dropdown to designate harvest frequency. If there was a major harvest of a product such as timber (e.g. major clear-cut) that is unlikely to be repeated, select "one-time" as the time period. If the frequency is less than once per year, there is no current dropdown option that corresponds to such frequencies. Instead, enter each occurrence of the cost as its own individual "one-time cost." For instance, if maintenance is carried out only once every three years, enter one-time entries for the maintenance cost in 2018, 2021, 2024, etc. through the end of the projection period.

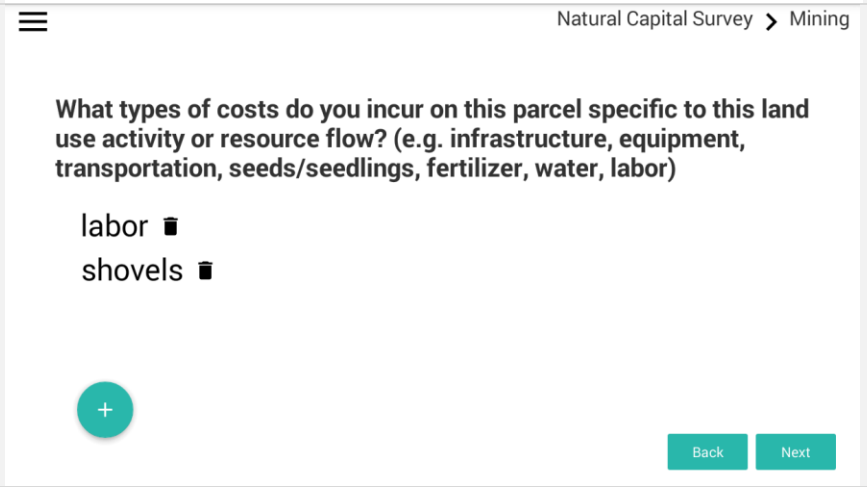
If harvest data is reported per household, enter the number of households, and enter the quantity of product harvested *per household*. If harvest data is reported as a total across all households, enter "1" for the number of households, and enter the total quantity harvested across all households.

The price unit is assumed to be in the same currency as originally entered when signing up.

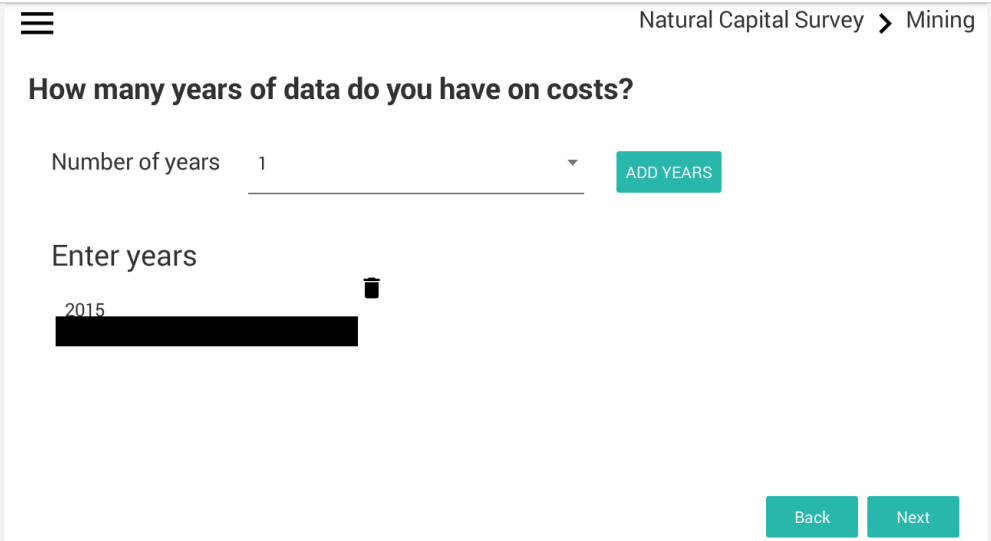
The % area extracted is optional, intended to give an indication of how much of the total stock is extracted each time – only a rough proxy because it may be difficult to assess.



The valuation will by default take an average of the data you entered for each particular product across all years. In some cases, the average may not be realistic. For example, the user may be aware of a downward or upward trend into the future that is not captured by simply taking an average. In such a case, select "No" and provide more realistic assumptions to be projected across the next 15 years.



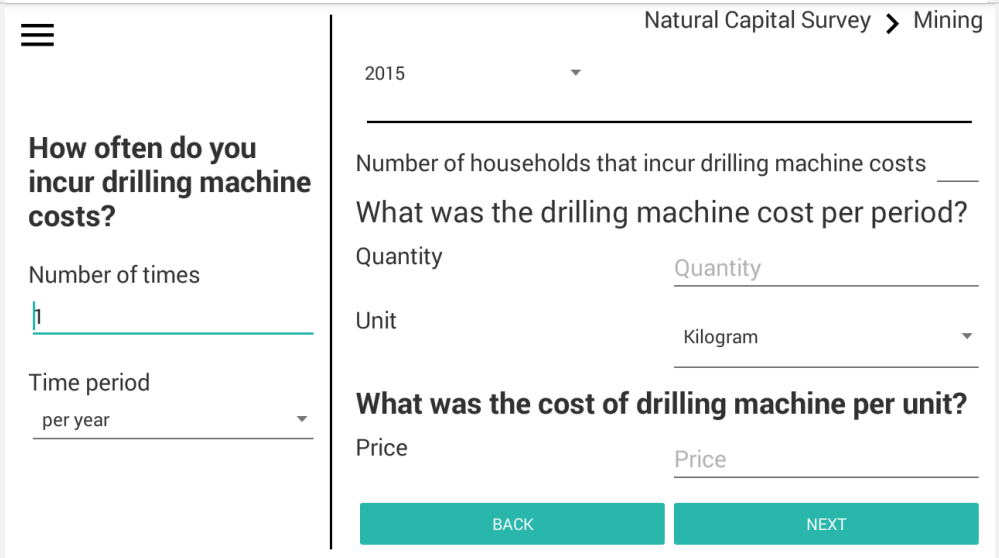
Add names of key costs incurred on the parcel specific to the specified land use activity or resource flow. Do not include costs associated with other activities or resource flows, there will be a section at the end where it is possible to input any more general shared costs incurred on the parcel that are not unique to this land use activity or resource flow.



Use the dropdown for each year that appears to select the year for which you have data. The years need not be consecutive. For example, if you only have data for 2011 and 2016, that is fine.

Although it is possible to enter only one year of data, accuracy of projections would be significantly compromised. At the very least try to enter data for two years representing a good year and bad year, or the situation before and after management in the case that a new resource management regime was introduced.

To delete a year, click the trash icon next to the year. To add more years, use the dropdown at the top to indicate the number of years you want to add and click **Add Years** again. The existing years will not be overridden.

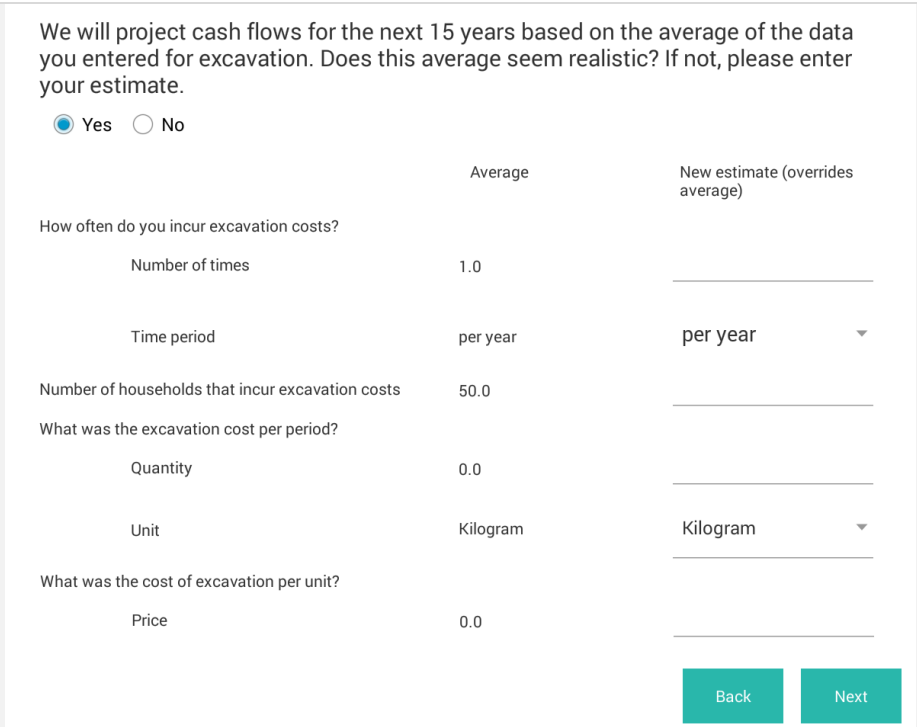


A page will be populated for each cost listed, for each year listed.

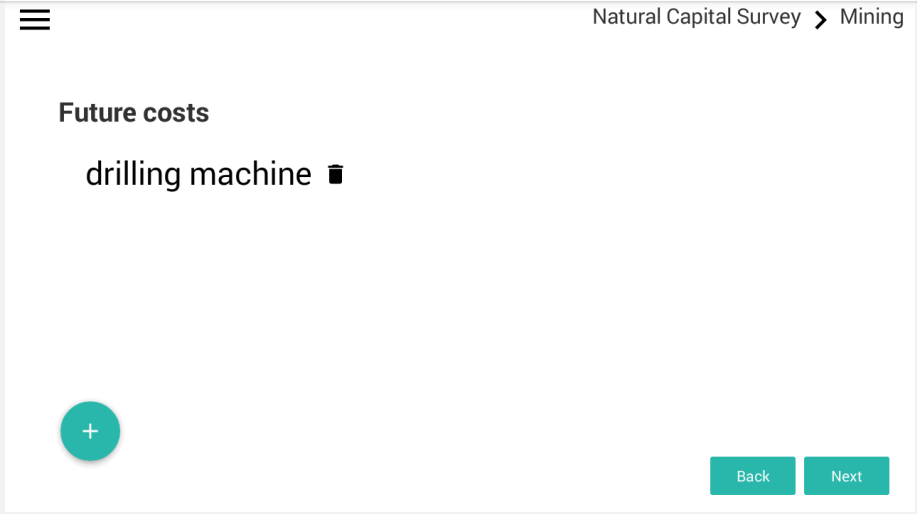
Use the **time period** dropdown to designate cost frequency. If there was a major one-time cost that is unlikely be repeated, select "one-time" as the time period. If the frequency is less than once per year, enter the appropriate fraction of a year. For instance, if maintenance is carried out only once every two years, select "per year" and enter "0.5." For greater precision, enter directly into the self-filling version of the Excel spreadsheet where it is possible to put in the precise values in specific years rather than a fraction each year.

If cost data is reported per household, enter the number of households, and enter the cost incurred *per household*. If cost data is reported as a total across all households, enter "1" for the number of households, and enter the total cost incurred across all households.

The price unit is assumed to be in the same currency as originally entered when signing up.



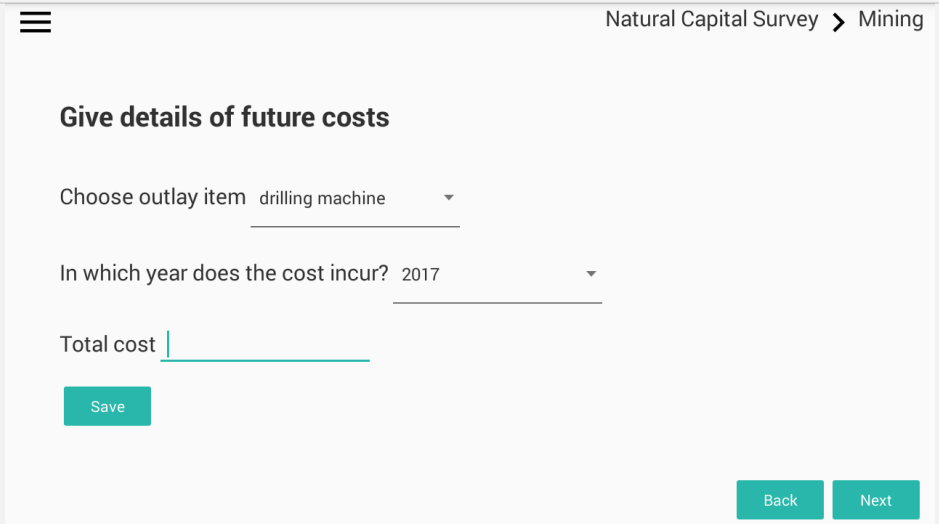
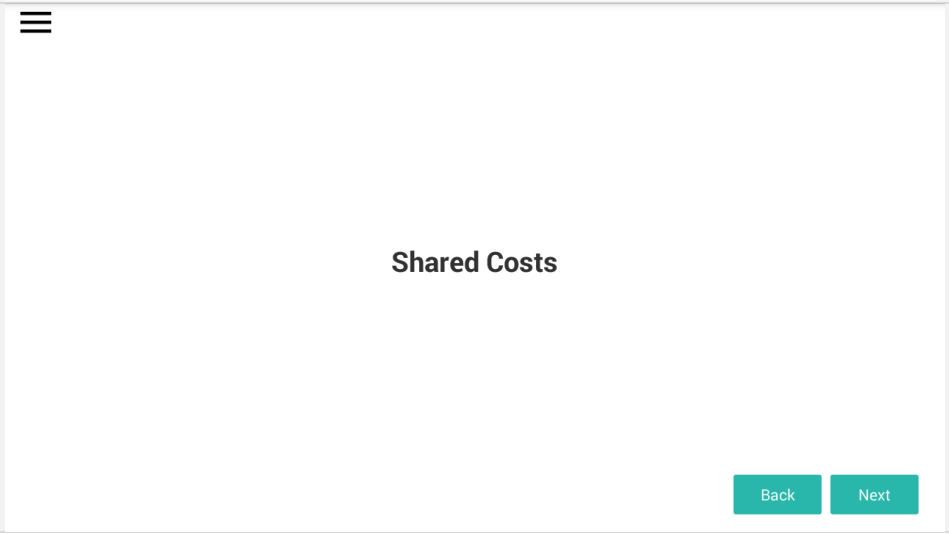
The valuation will by default take an average of the data you entered for each particular cost across all years. In some cases, the average may not be realistic. For example, the user may be aware of a downward or upward trend into the future that is not captured by simply taking an average. In such a case, select "No" and provide more realistic assumptions to be projected across the next 15 years.

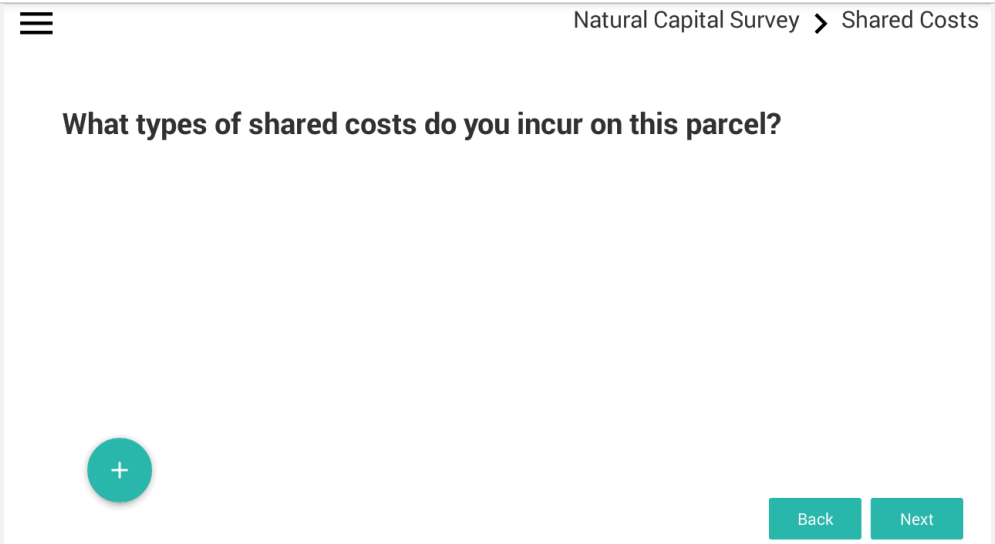


Add names of key additional future costs to be incurred on the parcel specific to the specified land use activity or resource flow, for example, investment in certain harvesting equipment.

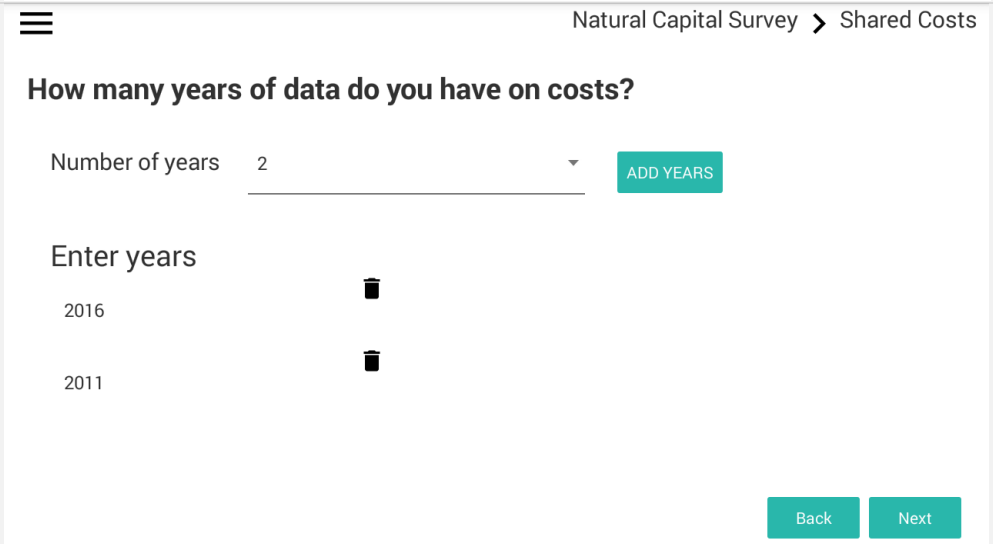
The app allows users to input assumptions on future costs. For future benefits associated with products already being harvested, the user can override projection assumptions in the historical section to include estimated future increases.

For new types of future benefits (e.g. a new type of nontimber forest product), the user will need to enter it in the earlier section on harvested products, insert 0 across all items in historical data, then override the assumptions in the projections section to include projected benefits going forward. Users can also use the Excel-based version to explore scenarios for future investments, as the Excel model has more flexibility relative to

	the app to accommodate data on both new future costs and benefits. Do not enter any existing costs that were already entered as part of historical data. Those will automatically be projected forward.
	A page will be populated for each future cost listed, for each year listed. Indicate the year in which the cost will first be incurred. It cannot be a previous year. The amount can currently only be reported as a total, rather than per household. If it is a recurring new future cost, enter the same cost for the relevant years. There is no way to indicate frequency for future costs in the current version. The amount is assumed to be in the same currency as originally entered when signing up.
	This section covers costs incurred across the whole parcel that are shared across land use activities or resource flows.



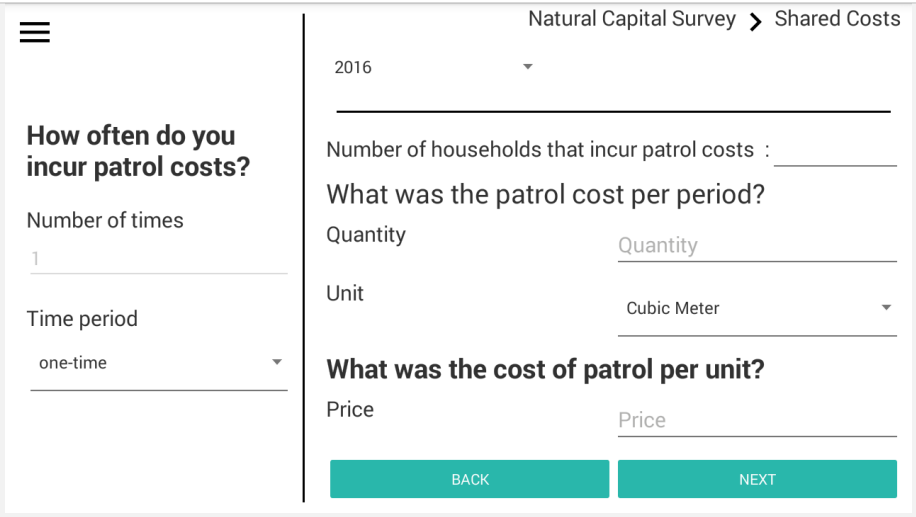
Add any costs that are incurred on the parcel across types of activities. For example, labor for patrol or fencing that helps with general maintenance that is not associated with a single land use activity would go here.



Use the dropdown for each year that appears to select the year for which you have data. The years need not be consecutive. For example, if you only have data for 2011 and 2016, that is fine.

Although it is possible to enter only one year of data, accuracy of projections would be significantly compromised. At the very least try to enter data for two years representing a good year and bad year, or the situation before and after management in the case that a new resource management regime was introduced.

To delete a year, click the trash icon next to the year. To add more years, use the dropdown at the top to indicate the number of years you want to add and click **Add Years** again. The existing years will not be overridden.

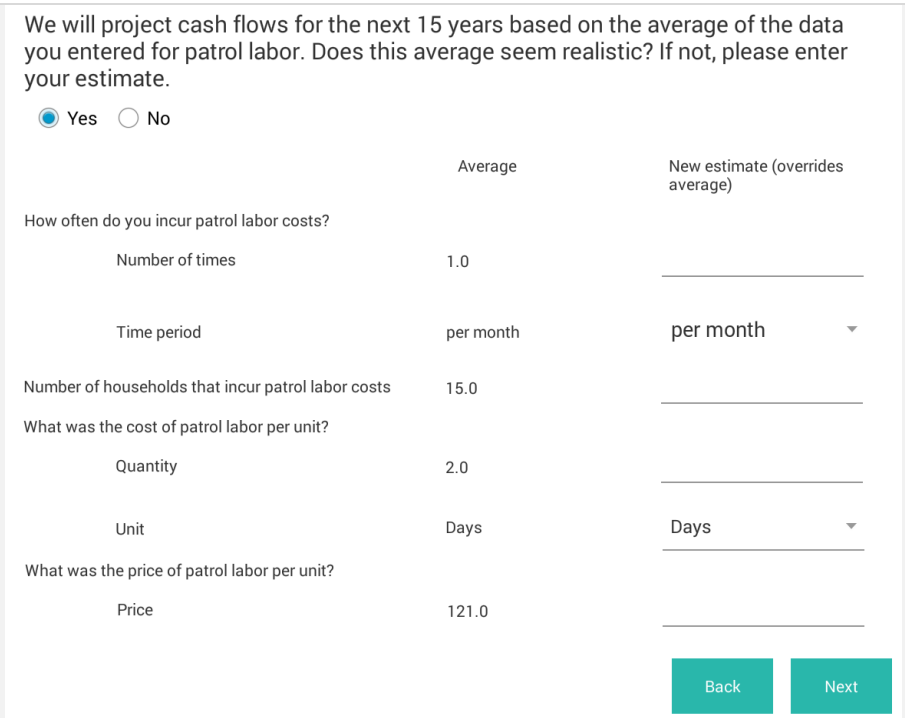


A page will be populated for each cost listed, for each year listed.

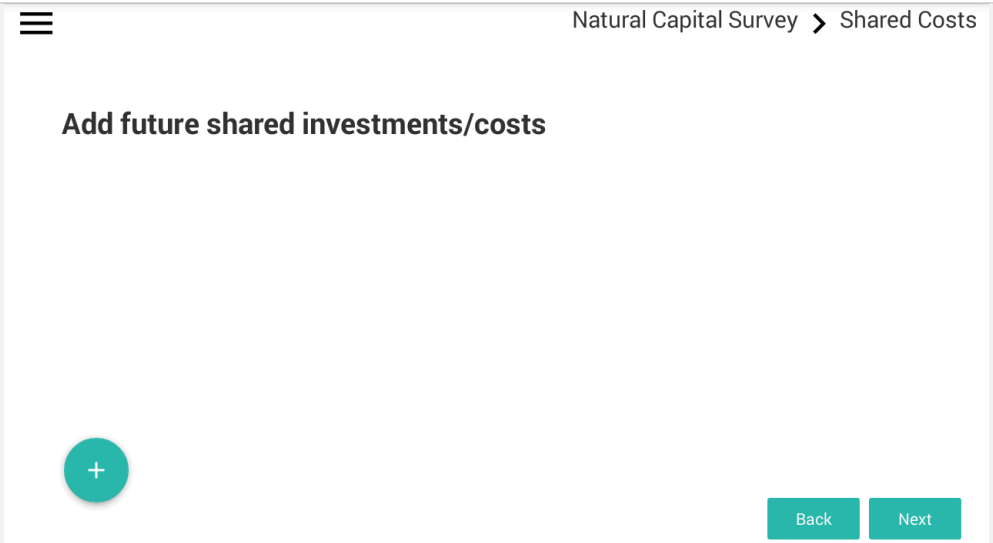
Use the **time period** dropdown to designate cost frequency. If there was a major one-time cost unlikely to be repeated, select "one-time." If the frequency is under once per year, enter a fraction of a year. For instance, if maintenance is carried out only once every two years, select "per year" and enter "0.5." For greater precision, enter directly into the self-filling version of the Excel spreadsheet where it is possible to put in the precise values in specific years rather than a fraction each year.

If cost data is reported per household, enter the number of households, and enter the cost incurred *per household*. If cost data is reported as a total across all households, enter "1" for the number of households, and enter the total cost incurred across all households.

The price unit is in the same currency entered when signing up.



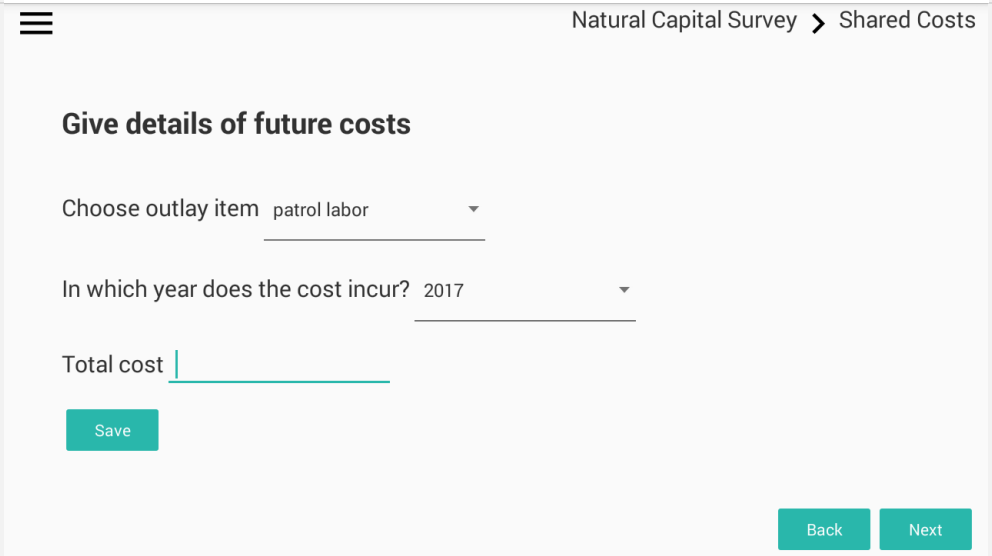
The valuation will by default take an average of the data you entered for each particular cost across all years. In some cases, the average may not be realistic. For example, the user may be aware of a downward or upward trend into the future that is not captured by simply taking an average. In such a case, select “No” and provide more realistic assumptions to be projected across the next 15 years.



Add names of key additional future costs to be incurred on the parcel across types of activities. For example, labor for patrol or fencing that helps with general maintenance that is not associated with a single land use activity would go here. These should only be included if there is certainty around future planned costs, involving consensus across key decisionmakers. Do not include costs that are prospective but still hypothetical.

Do not enter any existing costs that were already entered as part of historical data. Those will automatically be projected forward.

There is currently no place to project new future benefits, to be on the conservative side.



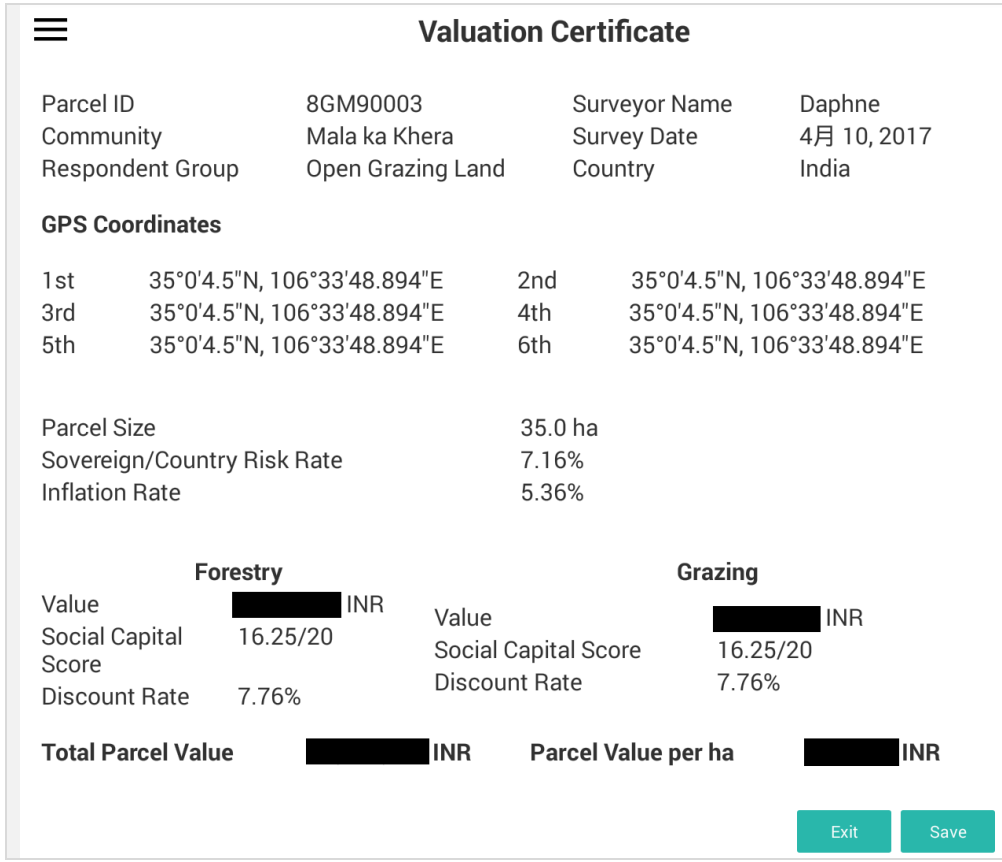
A page will be populated for each future cost listed, for each year listed. Indicate the year in which the cost will first be incurred. It cannot be a previous year.

The amount can currently only be reported as a total, rather than per household.

If it is a recurring new future cost, enter the same cost for the relevant years. There is no way to indicate frequency for future costs in the current version.

The amount is assumed to be in the same currency as originally entered when signing up.

Valuation Certificate



Valuation Certificate

Parcel ID	8GM90003	Surveyor Name	Daphne
Community	Mala ka Khera	Survey Date	4月 10, 2017
Respondent Group	Open Grazing Land	Country	India

GPS Coordinates

1st	35°0'4.5"N, 106°33'48.894"E	2nd	35°0'4.5"N, 106°33'48.894"E
3rd	35°0'4.5"N, 106°33'48.894"E	4th	35°0'4.5"N, 106°33'48.894"E
5th	35°0'4.5"N, 106°33'48.894"E	6th	35°0'4.5"N, 106°33'48.894"E

Parcel Size	35.0 ha
Sovereign/Country Risk Rate	7.16%
Inflation Rate	5.36%

Forestry		Grazing	
Value	[redacted] INR	Value	[redacted] INR
Social Capital Score	16.25/20	Social Capital Score	16.25/20
Discount Rate	7.76%	Discount Rate	7.76%

Total Parcel Value [redacted] **INR** **Parcel Value per ha** [redacted] **INR**

Exit Save

Once all sections are completed, the user will be shown the Valuation Certificate, which shows value of the parcel as a whole, as well as broken down by land use activity or resource flow. Each value is displayed in total as well as per hectare based on the area of the parcel. The discount rate and social capital score are displayed next to each land use activity/resource flow based on the social capital survey, as well as the country's sovereign risk rate.

Total parcel value will be rounded to the nearest thousand, in order to accommodate the uncertainty in large figures. **Parcel value per hectare** will be not rounded, given that it is typically a smaller amount. Although these values are reported as single figures, they are only estimates that provide a magnitude of order. Data validation should be conducted across all major sensitive data inputs in order to provide a more accurate value, and in some cases, gauge the margin of error between bottom-up reported data and scientifically validated or secondary data.

The valuation results are only as good as the data that go into them. For instance, if not all sections are properly filled out, this could lead to an undervaluation of the parcel. In addition, validation of data will be key, for example by checking data roughly estimated by communities or households against data collected through a scientific or official survey. Validation of these results can be carried out by benchmarking against the value of land parcels with similar land use activities, natural and social capital conditions.

8. Appendix C: Survey (Paper Format)

For users of the tool who want to use paper-based copies of the survey in the field, the full survey questionnaire is included below, possible to print.

It is recommended that the language in the questions first be adapted to the local context before finalizing for the field. The default currency listed throughout the current version is INR, Indian Rupees.

The answers from the paper-based survey can then be input into either the Android app version of the tool or into the Excel spreadsheet.

Rural Valuation Tool – Survey

Basics

Date: ___ ___ / ___ ___ / ___ ___ ___ ___

Respondent group: _____

Surveyor: _____

Community: _____

District: _____

State: _____

Country: _____

Language: _____

Currency: _____

Sovereign/country risk rate: _____%
(Sovereign/country risk rate source – 10-year government bond interest rate: www.tradingeconomics.com/bonds)

Inflation rate: _____%
(Inflation rate source: www.tradingeconomics/forecast/inflation-rate)

# of survey participants: _____

#	Participant Name	Occupation	Gender (M/F)	Age	Years of Education Completed
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					

What are the major land use activities or resource flows on your land?

☐ Forestry

☐ Grazing

☐ Agriculture

☐ Mining

☐ Other (Specify: _____)

What are the GPS coordinates of the parcel?

1: _____

2: _____

3: _____

4: _____

5: _____

Parcel area (hectares): _____

Social capital

Fill out a separate social capital survey for each land use type or resource flow relevant to the household(s), community, or other social unit using the tool.

What rights do households in this community have over the parcel specific to this land use activity?

☐ Right to access and use the parcel
☐ Right to benefit from the parcel
☐ Right to control how the parcel will be used
☐ Right to exclude others from unauthorized use of the parcel
☐ Right to pass rights to the parcel down to future generations or sell rights to others

What rights to the parcel specific to this land use activity are provided through a state-backed and legally recognized record (i.e. title, lease, etc.)? (check all that apply)

☐ Right to access and use the parcel
☐ Right to benefit from the parcel
☐ Right to control how the parcel will be used
☐ Right to exclude others from unauthorized use of the parcel
☐ Right to pass rights to the parcel down to future generations or sell rights to others

Are the boundaries for the land use activity on this parcel well known and understood by government authorities and/or community members? (circle one)

☐ Both
☐ Government or community only
☐ None

Does this group feel confident that they will be able to continue to use the parcel for this land use activity without constraints indefinitely into the future? (circle one)

☐ Yes
☐ Mostly
☐ Somewhat
☐ Maybe
☐ No

Are there any current disputes related to the boundaries or rights associated with this parcel related to this land use activity? (circle one)

☐ No
☐ One low level
☐ Multiple low level

☐ Open conflict

Do households in this community use the parcel for this land use activity based on locally recognized customary norms? (circle one)

☐ Yes
☐ Somewhat
☐ No

Is there a group or committee in this community with specific responsibility to manage or oversee matters related to use of this land use activity on the parcel? (circle one)

☐ Yes
☐ No

Are there rules and regulations associated with this land use activity on the parcel that were created by the community itself? (circle one)

☐ Yes
☐ Some
☐ No

Do all stakeholders within the community generally have equal access to the parcel for this land use activity? (circle one)

☐ Yes
☐ Somewhat
☐ No

Does the management group include representatives from all segments of the community? (circle one)

☐ Yes
☐ Half
☐ None

Are the rules and regulations associated with this land use activity on the parcel generally viewed as fair and legitimate? (circle one)

☐ Yes
☐ By many
☐ By some
☐ No

How long have the institutions associated with this land use activity on the parcel been operating? (circle one)

☐ 15+
☐ 11 to 15
☐ 6 to 10
☐ 1 to 5
☐ 0

How often are decisions made by the committee ignored or not implemented? (circle one)

☐ Never
☐ Sometimes
☐ Always
☐ N/A

How much of your community's livelihoods is generated by this land use activity on the parcel? (circle one)

☐ 75+%
☐ 25–75%
☐ 0–25%

Natural capital

Fill out a separate natural capital survey for each land use type or resource flow relevant to the household(s), community, or other social unit using the tool.

Forestry

Harvest activities

What timber do you harvest, if any?

Timber 1: _____

Timber 2: _____

Timber 3: _____

Timber 4: _____

What non-timber forest products (e.g. fuelwood, fodder, food, medicine) do you harvest, if any?

_____

Use: Fuelwood / Fodder / Food / Medicine / Other (specify:

_____)

_____

Use: Fuelwood / Fodder / Food / Medicine / Other (specify:

_____)

_____

Use: Fuelwood / Fodder / Food / Medicine / Other (specify:

_____)

_____

Use: Fuelwood / Fodder / Food / Medicine / Other (specify:

_____)

_____

Use: Fuelwood / Fodder / Food / Medicine / Other (specify:

_____)

_____

Use: Fuelwood / Fodder / Food / Medicine / Other (specify:

_____)

Benefits and costs

Enter the years for which you have data on harvest activities:

_____

_____

_____

_____

_____

_____

Harvest data

Enter harvest estimates for all major products, for the years listed.

Then calculate the average of historical data for each item. The valuation will project cash flows for the next 15 years. Does the average seem realistic to use for this projection? If not, please enter a more realistic estimate in the righthand column.

		Year				
Revenue	**Unit**				Average	Future Estimate
Timber 1						
How often do you harvest?	**# of times**/year					
# of households that harvest						
Quantity harvested each time per household	**m^3**/harvest					
Market price per unit	**INR**/m^3					
% area harvested each time						
Subtotal	INR					
NTFP 1						
How often do you harvest?	**# of times**/year					
# of households that harvest						
Quantity harvested each time	**kg**/harvest					
Market price per unit	**INR**/kg					
% harvest sold to market						
NTFP 2						
How often do you harvest?	**# of times**/year					
# of households that harvest						

Quantity harvested each time	kg/harvest					
Market price per unit	INR/kg					
% harvest sold to market						
NTFP 3						
How often do you harvest?	# of times/year					
# of households that harvest						
Quantity harvested each time	kg/harvest					
Market price per unit	INR/kg					
% harvest sold to market						
NTFP 4						
How often do you harvest?	# of times/year					
# of households that harvest						
Quantity harvested each time	kg/harvest					
Market price per unit	INR/kg					
% harvest sold to market						
Subtotal	INR					

Costs

What types of costs do you incur on the parcel specific to this land use activity? (circle all that apply)

- Infrastructure
- Equipment
- Transportation
- Seeds/seedlings
- Fertilizer
- Water
- Labor
- Other costs, specify: _____

Enter the years for which you have cost data:

_____

_____

_____

_____

_____

_____

		Year				
Cost	Unit				Average	Future estimate
Equipment						
How often do these expenses occur?	# of times/month					
Unit per period	other					
Cost per unit	INR					
Subtotal	INR	-	-	-	-	-
Transportation						
How often do these expenses occur?	# of times /month					
Unit per period	gallons of gas/month					
Cost per unit	INR/gallons of gas					
Subtotal	INR	-	-	-	-	-
Seeds/seedlings						
How often do these expenses occur?	# of times /year					
Unit per period	kg/year					
Cost per unit	INR/kg					
Subtotal	INR	-	-	-	-	-
Fertilizer						
How often do these expenses occur?	# of times /year					
Unit per period	kg/year					
Cost per unit	INR/kg					
Subtotal	INR	-	-	-	-	-
Water						
How often do these expenses occur?	# of times /month					
Unit per period	liters/month					
Cost per unit	INR/liters					
Subtotal	INR	-	-	-	-	-
Labor						

How often do these expenses occur?	**# of times** /month					
Unit per period	**hours**/month					
Cost per unit	**INR**/hour					
Subtotal	**INR**	-	-	-	-	-
Total	**INR**	-	-	-	-	-

Future

Do you plan on incurring any new future costs on the parcel specific to this land use activity, separate from those already entered for the past?

Yes/No

What type of costs? (circle all that apply)

- Infrastructure
- Equipment
- Transportation
- Seeds/seedlings
- Fertilizer
- Water
- Labor
- Other costs, specify: _____

		Year		
Cost	**Unit**			
Equipment				
How often do these expenses occur?	**# of times**/month			
Unit per period	**other**			
Cost per unit	**INR**			
Subtotal	**INR**	-	-	-
Transportation				
How often do these expenses occur?	**# of times** /month			
Unit per period	**gallons of gas**/month			
Cost per unit	**INR**/gallons of gas			
Subtotal	**INR**	-	-	-
Seeds/seedlings				
How often do these expenses occur?	**# of times** /year			
Unit per period	**kg**/year			
Cost per unit	**INR**/kg			
Subtotal	**INR**	-	-	-
Fertilizer				

How often do these expenses occur?	**# of times** /year			
Unit per period	**kg**/year			
Cost per unit	**INR**/kg			
Subtotal	**INR**	-	-	-
Water				
How often do these expenses occur?	per month			
Unit per period	kg			
Cost per unit	INR/kg			
Subtotal	INR	-	-	-
Labor				
How often do these expenses occur?	per month			
Unit per period	kg			
Cost per unit	INR/kg			
Subtotal	INR	-	-	-
Subtotal	INR	-	-	-

Grazing

What livestock do you raise, if any?

Livestock 1: _____

Livestock 2: _____

Livestock 3: _____

Livestock 4: _____

Livestock 5: _____

Livestock 6: _____

Livestock 7: _____

Fodder data

How many years of data do you have on livestock activity?

_____

_____

_____

_____

		Year				
	UNIT	2010	2012	2013	Average	Future estimate
Livestock 1						
How many months of a year do you graze livestock on this piece of land?	# of months					
Total amount of fodder consumed per animal per month	kg/animal/month					
Market price of fodder	INR/kg					
Number of livestock	# of animals					
Subtotal	INR	-	-	-	-	-
Livestock 2						
How many months of a year do you graze livestock on this piece of land?	# of months					
Total amount of fodder consumed per animal per month	kg/animal/month					
Market price of fodder	INR/kg					
Number of livestock	# of animals					
Subtotal	INR	-	-	-	-	-
Livestock 3						
How many months of a year do you graze livestock on this piece of land?	# of months					

Total amount of fodder consumed per animal per month	kg/animal/month					
Market price of fodder	INR/kg					
Number of livestock	# of animals					
Subtotal	INR	-	-	-	-	-
TOTAL	INR	-	-	-	-	-

Costs

What types of costs do you incur in the process of grazing livestock on this land?

- Infrastructure
- Equipment
- Transportation
- Seeds/seedlings
- Fertilizer
- Water
- Labor
- Other costs, specify: _____

Enter the years for which you have data:

_____

_____

_____

_____

		Year				
Cost	Unit				Average	Future estimate
Equipment						
How often do these expenses occur?	# of times/year					
Unit per period	other					
Cost per unit	INR					

Subtotal	INR					
Transportation						
How often do these expenses occur?	# of times/year					
Unit per period	gallons of gas/time					
Cost per unit	INR/gallon of gas					
Subtotal	INR					
Seed/seedling						
How often do these expenses occur?	# of times /year					
Unit per period	kg/time					
Cost per unit	INR/kg					
Subtotal	INR					
Fertilizer						
How often do these expenses occur?	# of times /month					
Unit per period	kg/time					
Cost per unit	INR/kg					
Subtotal	INR					
Water						
How often do these expenses occur?	# of times /month					
Unit per period	liters/time					
Cost per unit	INR/liters					
Subtotal	INR					
Labor						
How often do these expenses occur?	# of times /month					
Unit per period	hours/time					
Cost per unit	INR/hour					
Subtotal	INR					
Infrastructure						
How often do these expenses occur?	one time					
Unit per period	other					
Cost per unit	INR					
Subtotal	INR					
Tax, fees, etc.						
How often do these expenses occur?	# of times/year					

Unit per period	other					
Cost per unit	INR					
Subtotal	INR					
TOTAL COST	INR					

Future

Do you plan on incurring any new future costs specific to this land use activity, separate from those already entered for the past? (circle)

Yes/No

What type of costs?

- Infrastructure
- Equipment
- Transportation
- Seeds/seedlings
- Fertilizer
- Water
- Labor
- Other costs, specify: _____

		Year		
Cost	Unit			
Equipment				
How often do these expenses occur?	# of times/year			
Unit per period	other			
Cost per unit	INR			
Subtotal	INR			
Transportation				
How often do these expenses occur?	# of times/year			
Unit per period	gallons of gas/time			
Cost per unit	INR/gallon of gas			
Subtotal	INR			
Seed/seedling				

How often do these expenses occur?	# of times /year			
Unit per period	kg/time			
Cost per unit	INR/kg			
Subtotal	INR			
Fertilizer				
How often do these expenses occur?	# of times /month			
Unit per period	kg/time			
Cost per unit	INR/kg			
Subtotal	INR			
Water				
How often do these expenses occur?	# of times /month			
Unit per period	liters/time			
Cost per unit	INR/liters			
Subtotal	INR			
Labor				
How often do these expenses occur?	# of times /month			
Unit per period	hours/time			
Cost per unit	INR/hour			
Subtotal	INR			
Infrastructure				
How often do these expenses occur?	one time			
Unit per period	other			
Cost per unit	INR			
Subtotal	INR			
Tax, fees, etc.				
How often do these expenses occur?	# of times/year			
Unit per period	other			
Cost per unit	INR			
Subtotal	INR			
TOTAL COST	INR			

Agriculture

What crops do you harvest, if any?

Crop 1: _____

Crop 2: _____

Crop 3: _____

Crop 4: _____

Do you collect crop residues?

Yes / No

Revenues

Enter the years for which you have data:

_____

_____

_____

_____

_____

		Year				
	Unit				Average	Future estimate
Crop Type 1						
How often do you harvest?	**# of times**/year					
Quantity harvested each time	**kg**/harvest					
Market price per unit	**rupees**/kg					
Subtotal	rupees					
% harvest sold to market						
Crop Type 2						
How often do you harvest?	**# of times**/year					
Quantity harvested each time	**kg**/harvest					
Market price per unit	**rupees**/kg					
Subtotal	rupees					
% harvest sold to market						
Crop Type 3						
How often do you harvest?	**# of times**/year					
Quantity harvested each time	**kg**/harvest					
Market price per unit	**rupees**/kg					
% harvest sold to market						
Crop Residues						
How often do you collect	**# of times**/year					
Quantity collected each time	**kg**/harvest					
Market price per unit	**rupees**/kg					
% harvest sold to market						
Subtotal	rupees					

TOTAL REVENUE	rupees					

Costs

What types of costs do you incur in the process of cultivating crops on this land?

- Infrastructure
- Equipment
- Transportation
- Seeds/seedlings
- Fertilizer
- Water
- Labor
- Other costs, specify: _____

Enter the years for which you have data:

_____

_____

_____

_____

		Year				
Cost	Unit				Average	Future estimate
Equipment						
How often do these expenses occur?	# of times/year					
Unit per period	other					
Cost per unit	INR					
Subtotal	INR					
Transportation						
How often do these expenses occur?	# of times/year					
Unit per period	gallons of gas/time					
Cost per unit	INR/gallon of gas					
Subtotal	INR					
Seed/seedling						

How often do these expenses occur?	# of times /year					
Unit per period	kg/time					
Cost per unit	INR/kg					
Subtotal	INR					
Fertilizer						
How often do these expenses occur?	# of times /month					
Unit per period	kg/time					
Cost per unit	INR/kg					
Subtotal	INR					
Water						
How often do these expenses occur?	# of times /month					
Unit per period	liters/time					
Cost per unit	INR/liters					
Subtotal	INR					
Labor						
How often do these expenses occur?	# of times /month					
Unit per period	hours/time					
Cost per unit	INR/hour					
Subtotal	INR					
Infrastructure						
How often do these expenses occur?	one time					
Unit per period	other					
Cost per unit	INR					
Subtotal	INR					
Tax, fees, etc.						
How often do these expenses occur?	# of times/year					
Unit per period	other					
Cost per unit	INR					
Subtotal	INR					
TOTAL COST	INR					

Future

Do you plan on incurring any new future costs specific to agriculture, separate from those already entered for the past? (circle)

Yes/No

What type of costs?

- Infrastructure
- Equipment
- Transportation
- Seeds/seedlings
- Fertilizer
- Water
- Labor
- Other costs, specify: _____

		Year		
Cost	Unit			
Equipment				
How often do these expenses occur?	# of times/year			
Unit per period	other			
Cost per unit	INR			
Subtotal	INR			
Transportation				
How often do these expenses occur?	# of times/year			
Unit per period	gallons of gas/time			
Cost per unit	INR/gallon of gas			
Subtotal	INR			
Seed/seedling				
How often do these expenses occur?	# of times /year			
Unit per period	kg/time			
Cost per unit	INR/kg			
Subtotal	INR			
Fertilizer				
How often do these expenses occur?	# of times /month			
Unit per period	kg/time			
Cost per unit	INR/kg			
Subtotal	INR			
Water				
How often do these expenses occur?	# of times /month			
Unit per period	liters/time			

Cost per unit	INR/liters			
Subtotal	INR			
Labor				
How often do these expenses occur?	# of times /month			
Unit per period	hours/time			
Cost per unit	INR/hour			
Subtotal	INR			
Infrastructure				
How often do these expenses occur?	one time			
Unit per period	other			
Cost per unit	INR			
Subtotal	INR			
Tax, fees, etc.				
How often do these expenses occur?	# of times/year			
Unit per period	other			
Cost per unit	INR			
Subtotal	INR			
TOTAL COST	INR			

Mining

What minerals do you extract, if any?

Mineral 1: _____

Mineral 2: _____

Mineral 3: _____

Mineral 4: _____

Extraction data

Enter the years for which you have data:

_____

_____

_____

_____

_____

_____

		Year				
	Unit				Average	Future estimate
Mineral Type 1						
How often do you extract?	**# of times**/year					
Quantity extracted each time	**kg**/extraction					
Market price per unit	**rupees**/kg					
Subtotal	rupees					
% extracted sold to market						
Mineral Type 2						
How often do you extract?	**# of times**/year					
Quantity extracted each time	**kg**/extraction					
Market price per unit	**rupees**/kg					
Subtotal	rupees					
% extracted sold to market						
Mineral Type 3						
How often do you extract?	**# of times**/year					
Quantity extracted each time	**kg**/extraction					
Market price per unit	**rupees**/kg					
Subtotal	rupees					
% extracted sold to market						
TOTAL BENEFITS	rupees					

Costs

What types of costs do you incur in the process of mining on this land?

- Infrastructure
- Equipment
- Transportation
- Seeds/seedlings
- Fertilizer
- Water
- Labor
- Other costs, specify: _____

Enter the years for which you have data:

_____

_____

_____

_____

		Year				
Cost	Unit				Average	Future estimate
Equipment						
How often do these expenses occur?	# of times/year					
Unit per period	other					
Cost per unit	INR					
Subtotal	INR					
Transportation						
How often do these expenses occur?	# of times/year					
Unit per period	gallons of gas/time					
Cost per unit	INR/gallon of gas					
Subtotal	INR					
Seed/seedling						
How often do these expenses occur?	# of times /year					
Unit per period	kg/time					
Cost per unit	INR/kg					
Subtotal	INR					
Fertilizer						
How often do these expenses occur?	# of times /month					
Unit per period	kg/time					
Cost per unit	INR/kg					
Subtotal	INR					
Water						

How often do these expenses occur?	# of times /month					
Unit per period	liters/time					
Cost per unit	INR/liters					
Subtotal	INR					
Labor						
How often do these expenses occur?	# of times /month					
Unit per period	hours/time					
Cost per unit	INR/hour					
Subtotal	INR					
Infrastructure						
How often do these expenses occur?	one time					
Unit per period	other					
Cost per unit	INR					
Subtotal	INR					
Tax, fees, etc.						
How often do these expenses occur?	# of times/year					
Unit per period	other					
Cost per unit	INR					
Subtotal	INR					
TOTAL COST	INR					

Future

Do you plan on incurring any new future costs specific to mining, separate from those already entered for the past? (circle)

Yes/No

What type of costs?

- Infrastructure
- Equipment
- Transportation
- Seeds/seedlings
- Fertilizer
- Water
- Labor
- Other costs, specify: _____

		Year		
Cost	Unit			
Equipment				
How often do these expenses occur?	# of times/year			
Unit per period	other			
Cost per unit	INR			
Subtotal	INR			
Transportation				
How often do these expenses occur?	# of times/year			
Unit per period	gallons of gas/time			
Cost per unit	INR/gallon of gas			
Subtotal	INR			
Water				
How often do these expenses occur?	# of times /month			
Unit per period	liters/time			
Cost per unit	INR/liters			
Subtotal	INR			
Labor				
How often do these expenses occur?	# of times /month			
Unit per period	hours/time			
Cost per unit	INR/hour			
Subtotal	INR			
Infrastructure				
How often do these expenses occur?	one time			
Unit per period	other			
Cost per unit	INR			
Subtotal	INR			
Tax, fees, etc.				
How often do these expenses occur?	# of times/year			
Unit per period	other			
Cost per unit	INR			
Subtotal	INR			
TOTAL COST	INR			

Shared costs

Historical & Current Costs

What types of shared costs do you incur on this parcel?

- Infrastructure
- Equipment
- Transportation
- Seeds/seedlings
- Fertilizer
- Water
- Labor
- Other costs, specify: _____

Enter the years for which you have data:

_____

_____

_____

_____

		Year				
Cost	Unit				Average	Future estimate
Equipment						
How often do these expenses occur?	# of times/year					
Unit per period	other					
Cost per unit	INR					
Subtotal	INR					
Transportation						
How often do these expenses occur?	# of times/year					
Unit per period	gallons of gas/time					
Cost per unit	INR/gallon of gas					
Subtotal	INR					
Seeds/seedling						
How often do these expenses occur?	# of times /year					
Unit per period	kg/time					

Cost per unit	INR/kg					
Subtotal	INR					
Fertilizer						
How often do these expenses occur?	# of times /month					
Unit per period	kg/time					
Cost per unit	INR/kg					
Subtotal	INR					
Water						
How often do these expenses occur?	# of times /month					
Unit per period	liters/time					
Cost per unit	INR/liters					
Subtotal	INR					
Labor						
How often do these expenses occur?	# of times /month					
Unit per period	hours/time					
Cost per unit	INR/hour					
Subtotal	INR					
Infrastructure						
How often do these expenses occur?	one time					
Unit per period	other					
Cost per unit	INR					
Subtotal	INR					
Tax, fees, etc.						
How often do these expenses occur?	# of times/year					
Unit per period	other					
Cost per unit	INR					
Subtotal	INR					
TOTAL COST	INR					

Future Costs

What types of shared costs do you anticipate incurring on this parcel in the future?

- Infrastructure
- Equipment
- Transportation
- Seeds/seedlings

- Fertilizer
- Water
- Labor
- Other costs, specify: _____

Enter the years for which you have data:

_____

_____

_____

_____

		Year			
Cost	Unit				Average
Equipment					
How often do these expenses occur?	# of times/year				
Unit per period	other				
Cost per unit	INR				
Subtotal	INR				
Transportation					
How often do these expenses occur?	# of times/year				
Unit per period	gallons of gas/time				
Cost per unit	INR/gallon of gas				
Subtotal	INR				
Seeds/seedling					
How often do these expenses occur?	# of times /year				
Unit per period	kg/time				
Cost per unit	INR/kg				
Subtotal	INR				
Fertilizer					
How often do these expenses occur?	# of times /month				
Unit per period	kg/time				
Cost per unit	INR/kg				
Subtotal	INR				
Water					

How often do these expenses occur?	# of times /month				
Unit per period	liters/time				
Cost per unit	INR/liters				
Subtotal	INR				
Labor					
How often do these expenses occur?	# of times /month				
Unit per period	hours/time				
Cost per unit	INR/hour				
Subtotal	INR				
Infrastructure					
How often do these expenses occur?	one time				
Unit per period	other				
Cost per unit	INR				
Subtotal	INR				
Tax, fees, etc.					
How often do these expenses occur?	# of times/year				
Unit per period	other				
Cost per unit	INR				
Subtotal	INR				
TOTAL COST	INR				

9. Appendix D: Excel Model

The answers from the paper-based survey can be input into the Excel spreadsheet. Compared to inputting the data into the Android app, the Excel-based version of the valuation model offers flexibility to users for customization and can accommodate additional land use activities.

It is recommended to input data into the Android app instead when the user needs a more user-friendly interface to enter data; has limited literacy with Excel; and/or only needs to value natural capital based on the major land use activities already covered in the app: forestry, agriculture, grazing, and mining.