CIF CLIMATE INVESTMENT FUNDS

DEVELOPMENT IMPACTS OF CLIMATE FINANCE: A WORKBOOK

// October 2023

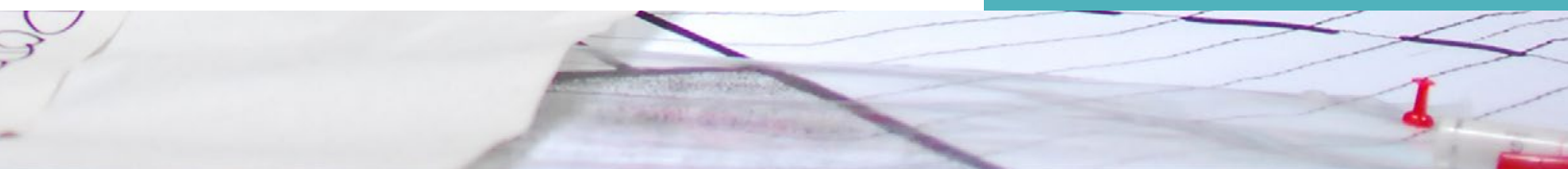
EVALUATION AND LEARNING INITIATIVE//

Workbook

CIF Programs: **All**

TOPICS

- Social Inclusion
- Economic Benefits
- Climate Finance



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This report is based on research carried out from 2021 to 2022. More recent data may have become available since the research was completed.

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1. INTRO-DUCTION

Climate finance is instrumental in achieving wider development impacts. Development impacts (DIs)—sometimes called "co-benefits"—are the contributions that climate programs make above and beyond their core climate change objectives. This includes advancing broader social, economic, environmental, and market development objectives, including, among others, job creation, economic growth, improved health outcomes, market development, social inclusion, and greater gender equality. They can be difficult to assess and measure, but there is consensus that being able to deliver development impacts through climate investments can significantly strengthen the business case for increased and more ambitious climate finance. At the same time, a more robust and nuanced understanding of these DIs can enable climate financiers and development practitioners to maximize co-benefits.

In March 2023, the Climate Investment Funds (CIF) published an independent evaluation, the Evaluation of the Development Impacts from CIF's Investments that drew evidence from CIF's extensive portfolio of investments. The evaluation provided evidence confirming the link between climate investments and DIs, developed tools to help climate investors maximize DIs, and demonstrated how measurement and modeling can be used to assess DIs to support more informed investment decisions.

In addition to a final evaluation report, the evaluation included a secondary information review of broader climate finance programs, a modeling and portfolio analysis on the application and relevance of advanced modeling approaches to estimate DIs, and 13 case studies that provide insights on how CIF projects contributed to DIs. A summary brief was also published alongside the evaluation.

Industrial Economics, Incorporated (IEc), and its subcontractors Trinomics B.V., Ross Strategic, Dr. Johanna Polvi, and Dr. Sergei Paltsev (the IEc team), conducted the evaluation.

This workbook accompanies the evaluation as a step-by-step practical guide on how to plan for DIs. This workbook provides tools for project planners and implementors to explore how to maximize DIs of climate finance projects. It seeks to help climate investors put into action the lessons and insights from the evaluation.

2. DEVELOP-MENT IMPACTS TAXONOMY

The first step to achieving DIs is identifying the range of DIs that can be realized. As part of the evaluation, the team conducted a secondary information review of 35 CIF-related reports and 24 external reports. The secondary information review identified over 60 DIs that can be realized through interventions supported by climate finance. The DIs are organized into a Climate Finance DI Taxonomy around four main DI categories — social, economic, environmental, and market development — and 11 subcategories, in addition to the cross-cutting dimensions, as illustrated in Table 1. The cross-cutting dimensions—relevant across all DI categories— are 1) impacts on women and other vulnerable or excluded populations and 2) built capacity. Several aspects of inclusivity and justice are also included as specific DIs under market development, where they were identified in the secondary review.

TABLE 1. Climate Finance DI Taxonomy

SOCIAL
1. Livelihoods, wealth, and quality of life
Increased or diversified income
Wealth generation
Recognition of tenure rights
Increased access to markets
Acquisition of transferable job skills
Improved working conditions
Increased ability to cope with shocks
Reduced losses from extreme climate events
Increased capacity of local institutions
Community engagement / collaborative implementation
2. Health and safety
Increased food security
Reduced illegal activity
Avoided negative health impacts from fossil fuels
3. Essential services
Increased access to electricity (households / businesses)
Increased electricity reliability / decreased outages (households / businesses)
Reduced costs of essential services (households / businesses)
Increased access to public transportation
Increased access to water or improved reliability
Increased access to healthcare / medicine
Increased access to infrastructure
Increased access to education
ECONOMIC
4. Employment opportunities
Increase in direct employment (permanent [perm] or temporary [temp])
Increase in indirect employment (perm / temp)
Increase in induced employment (perm / temp)
Increased earnings from employment (all types)
5. Economic value add (GDP)
Increased economic outputs
CROSS-CUTTING DIMENSIONS
Inclusion and empowerment
Gender inclusion, impacts on women and girls
Vulnerable populations and local stakeholders impacts
Capacity
Built capacity (within specific stakeholders)

ENVIRONMENTAL
6. Natural resources
Reduced air pollutants
Improved water quality
7. Ecosystem and biodiversity
Improved legal / regulatory framework
Improved forest management planning
Enhanced forest stocks
Increase in sustainable land use
8. Soil and crop productivity
Increased productivity of agriculture
Improved soil health
Reduced use of inputs or natural resources
MARKET DEVELOPMENT
9. Competitiveness and industrial development (all sectors)
Increased small and medium enterprises (SMEs) in the market
Improved integration / connectivity of systems
Supply chain development
Maturation of market structures
Increased technology adoption
Expanded access to capital
Reduced operating costs (e.g., energy)
Increased affordability of low-carbon technologies
Increased / diversified product offerings
Reduced trade imbalance
More projects / products meeting international standards
Improved legal / regulatory framework, capacity, governance
10. Energy sector security and resilience
Increased market entrants
Increased local energy generation
Reduced transmission / distribution line losses
Diversification of energy sources
Increased sector integration
Increased financial stability
Reduced fuel imports
Increased regulatory / governance capacity
Improved planning for shocks and stresses
11. Inclusiveness and justice
Inclusiveness and energy justice
Inclusive business models (e.g., women, others)
Inclusive regulation (e.g., women, others)

Exercise:

Choose a climate project that you are planning, currently working on, or have worked on in the past. With that project in mind and using the Climate Finance DI Taxonomy in Table 1, answer the following questions:

1 | Which of the potential DIs in Table 1 have you assessed and/or observed occurring in your projects/ programs? Write down 2-3 impacts.

2 | Were these development impacts being tracked explicitly in the project? If so, how? If not, why not?

3. DEVELOPMENT IMPACT PATHWAYS

The Climate Finance DI Taxonomy provides a baseline reference for the range of DIs that could be realized through climate finance activities, but it does not explain how the DIs may be realized. Development Impact Pathways illustrate how climate investments can lead to different DIs.

The diagrams below illustrate the impact pathways for two CIF projects — one for a utility-scale energy project in Thailand and another for a sustainable forestry project in Indonesia. Figure 1 illustrates how investments in utility-scale wind projects can lead to increased wind market activity and development, thereby producing DIs such as employment opportunities and local and regional economic benefits. It also shows how these investments led to the diversification of energy sources, which reduced air pollutants and fuel imports and ultimately led to avoided negative health impacts and increased energy sector resilience.

Similarly, Figure 2 illustrates that investment in sustainable or resilient land management can protect crops and boost or diversify livelihoods, resulting in DIs such as increased women's participation, reduced deforestation, and improved access to essential services. More details on all the case studies can be found here.

FIGURE 1. Example Impact Pathway for Utility-Scale Renewable Energy Generation

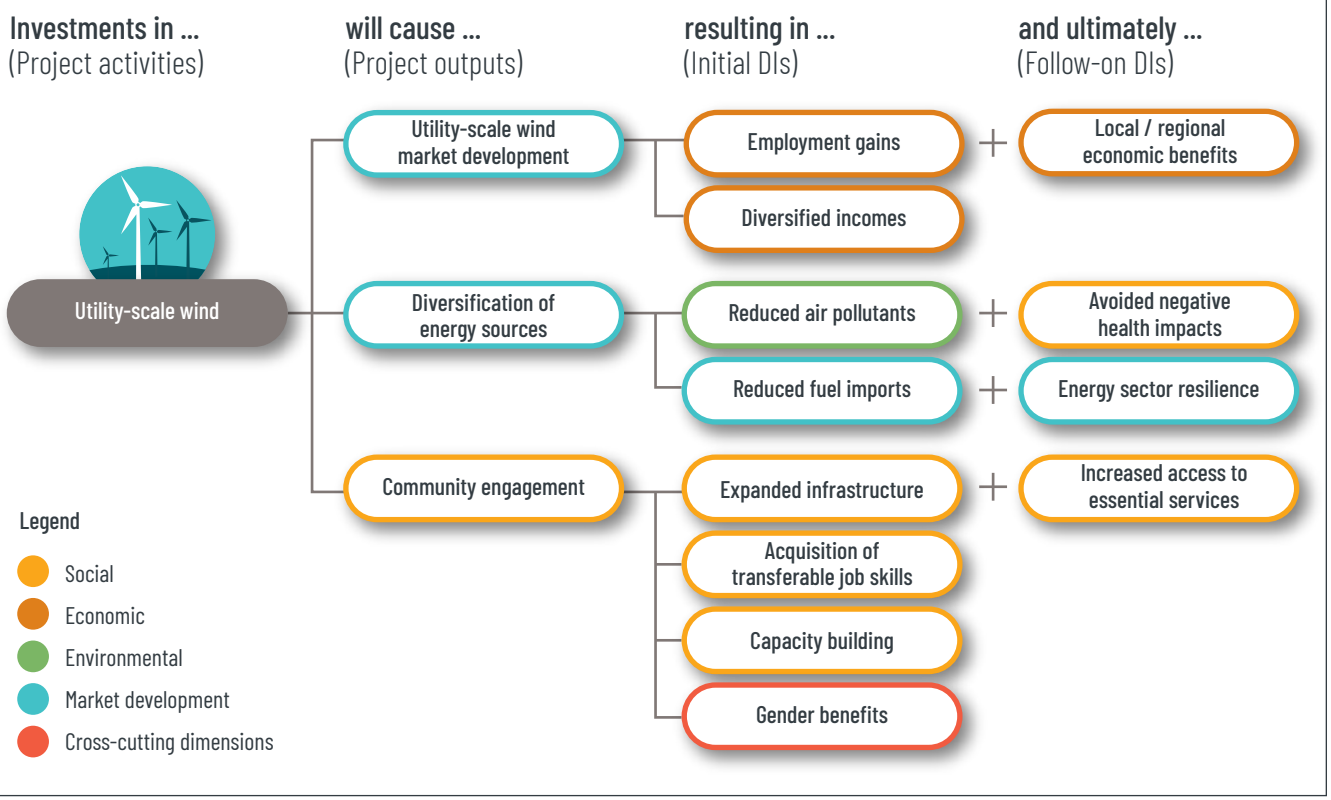
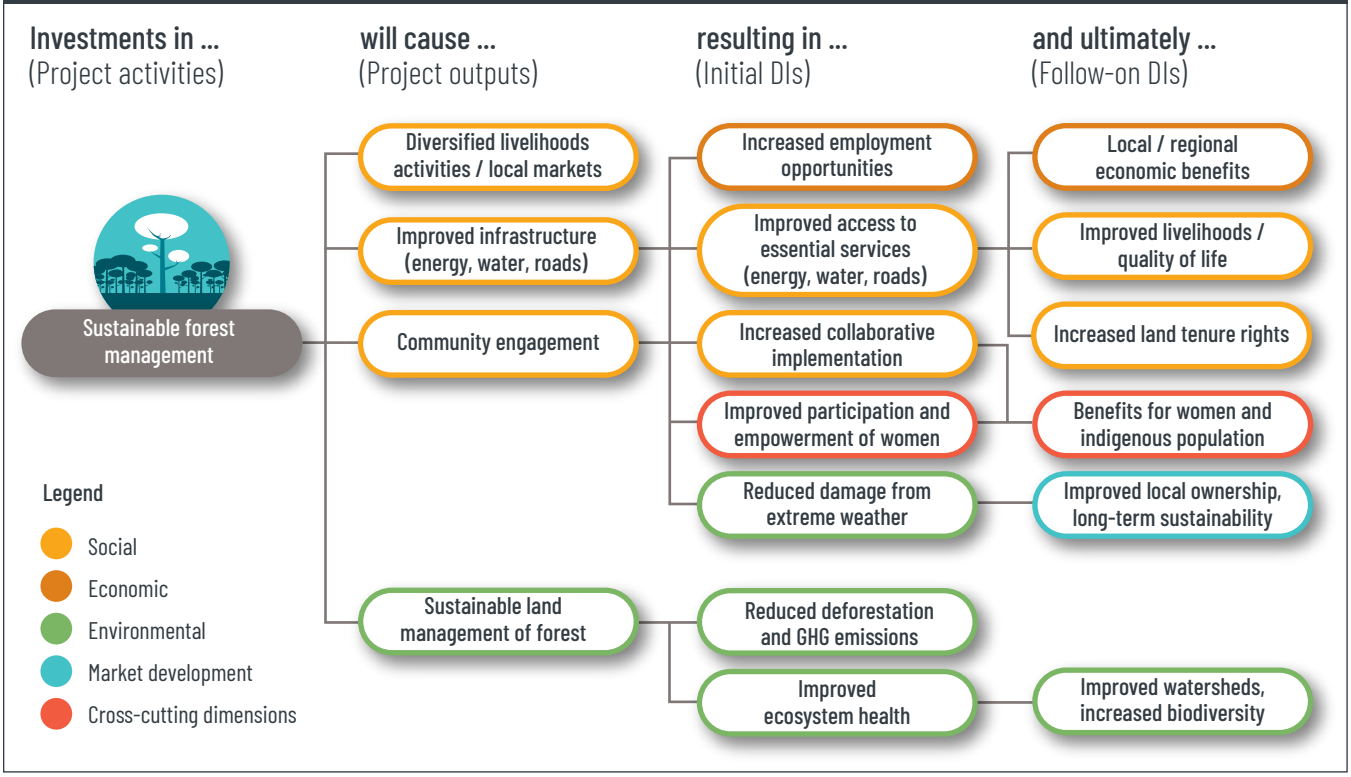


FIGURE 2. Example Impact Pathway for Sustainable Forest Management

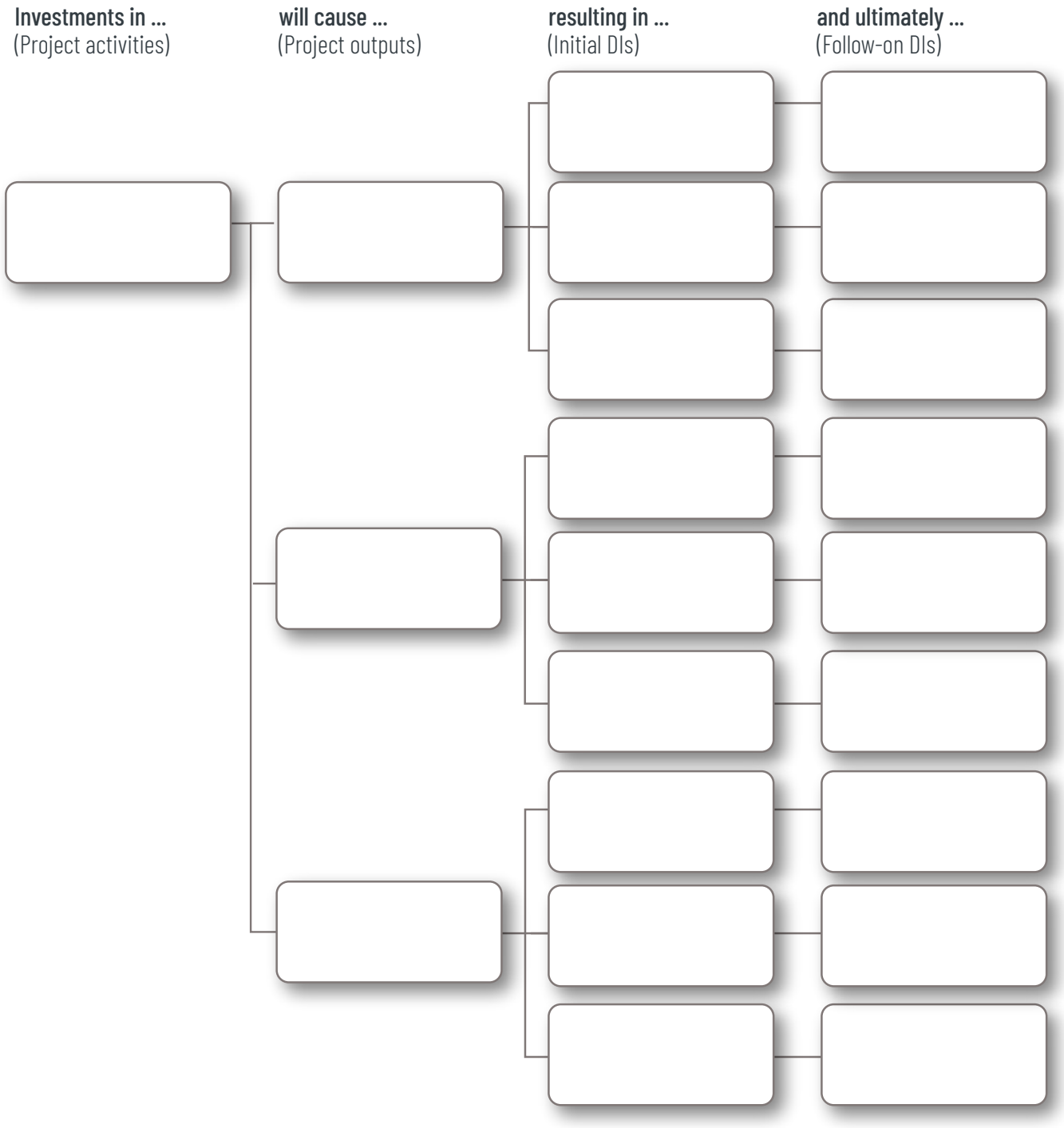


DI pathways can help investors consciously plan for DIs when designing programs/projects. A **backcasting** approach can enable investors to plan for more relevant DIs and shape how projects are designed, implemented, monitored, and evaluated accordingly. If climate investors design a climate intervention and then add DI objectives, they may not achieve the most important DIs in a particular place. They can achieve better results if they identify the most important DIs through diagnostic work and investment planning. Then they can progressively work back to what energy source/adaptation response would meet those development needs, and perhaps consider other factors, such as alternative ownership, the distribution of benefits, and empowerment of communities.

Exercise

Using the template in Figure 3, draw a potential DI pathway for your program/project, adding the principal outputs and DIs. You may also mark each DI category (social, economic, environmental, market development, or cross-cutting dimensions) according to the color scheme above. If there are certain DIs that you want to achieve, try adding those in the last column on the right, and then work backward using a backcasting approach to determine the interventions that would be most useful to achieve those DIs. Additional space is provided in Annex 1 if needed.

FIGURE 3. Create Your Own Impact Pathway



4. DRIVERS AND CONSTRAINTS

Progress toward achieving DIs through climate finance is facilitated or impeded by drivers and constraints at different levels of the project's implementation and impact pathway. Table 2 defines the six main types of drivers and constraints identified in the evaluation and provides an example of each.

TABLE 2. Drivers and Constraints Affecting Development Impact Results

DRIVER / CONSTRAINT TYPE	DESCRIPTION	EXAMPLE
Institutional	Government support, regulations, and policy framework	Constraint: Regulatory barriers preventing wind turbine construction
Financial	Availability and adequacy of financing	Constraint: Perception of high risk, preventing investors from financing activities in the geothermal sector
Built capacity and workforce development	Capacity of government institutions, local organizations, and local workforces	Driver: Capacity building for local technicians / firms on new rooftop solar technologies
Technical and infrastructure	Technology and infrastructure use or access	Constraint: Limitations in power grid function
Community engagement and social inclusion	Engagement and inclusion of specific communities and vulnerable groups (for example, women)	Driver: Meaningful community participation and / or benefits
Programmatic management	Project / investment planning and management, including program / project design	Driver: Adequate data collection capacity to monitor DI objectives

Figure 4 shows how drivers and constraints affected the DI pathways for the utility-scale wind case study in Thailand.

Driver (green arrow): Regulatory barriers in Thailand prevented the construction of wind turbines, and thus, the achievement of any resulting DIs, but the project's coordination with the government was a key driver in the removal of permitting requirements.

Constraint (red arrow): The uncertainty about restrictions on the ability of wind facilities to lease land designated for agricultural purposes was and remains a barrier to the construction of wind facilities and the realization of resulting DIs.

FIGURE 4. Drivers and Constraints in the Impact Pathway for Thailand's Utility-Scale Wind Project

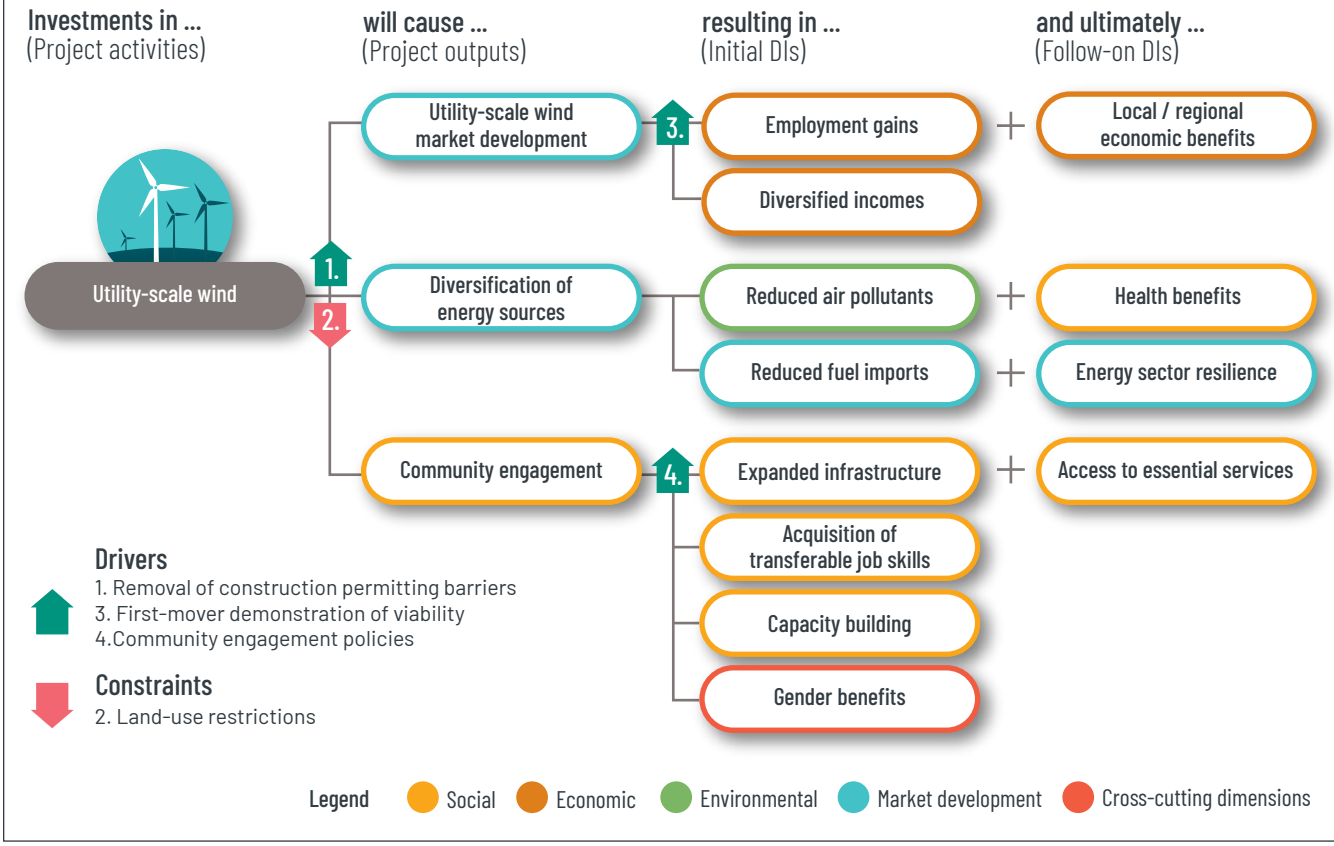
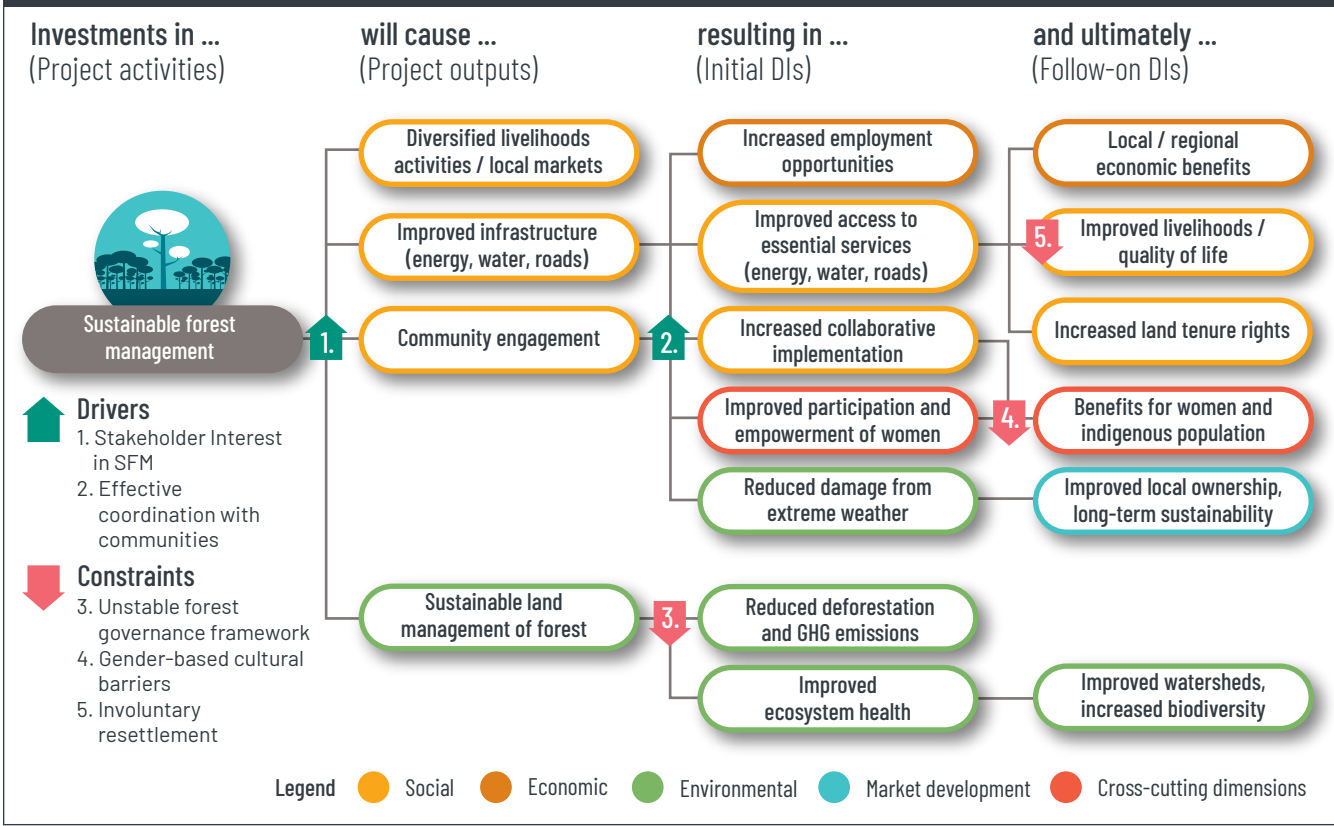


Figure 5 illustrates how drivers and constraints affected the DI pathways for the sustainable forest management project in Indonesia.

Driver (green arrow): Effective coordination with communities by involving community-based organization and developing frameworks for engaging community members, such as a Gender Action Plan, was key for enabling DIs such as improved participation of women and benefits for women and Indigenous populations.

Constraint (red arrow): Institutional challenges involving changing frameworks for forest governance that disincentivizes and delays community engagement was a barrier to achieving increased land tenure rights, benefits for women and Indigenous populations, and improved local ownership.

FIGURE 5. Drivers and Constraints in the Impact Pathway for Indonesia's Sustainable Forest Management Project



Exercise

Take a look at your Development Impact Pathway on page 10.

1 Based on your experiences, which types of drivers or constraints might be present to support or hinder the achievement of the development impacts in your pathway? List below.

3 Where do you think the drivers and constraints would appear in the impact pathway? Place green and/or red arrows on your DI pathway to mark each of these drivers and constraints in your impact pathway.

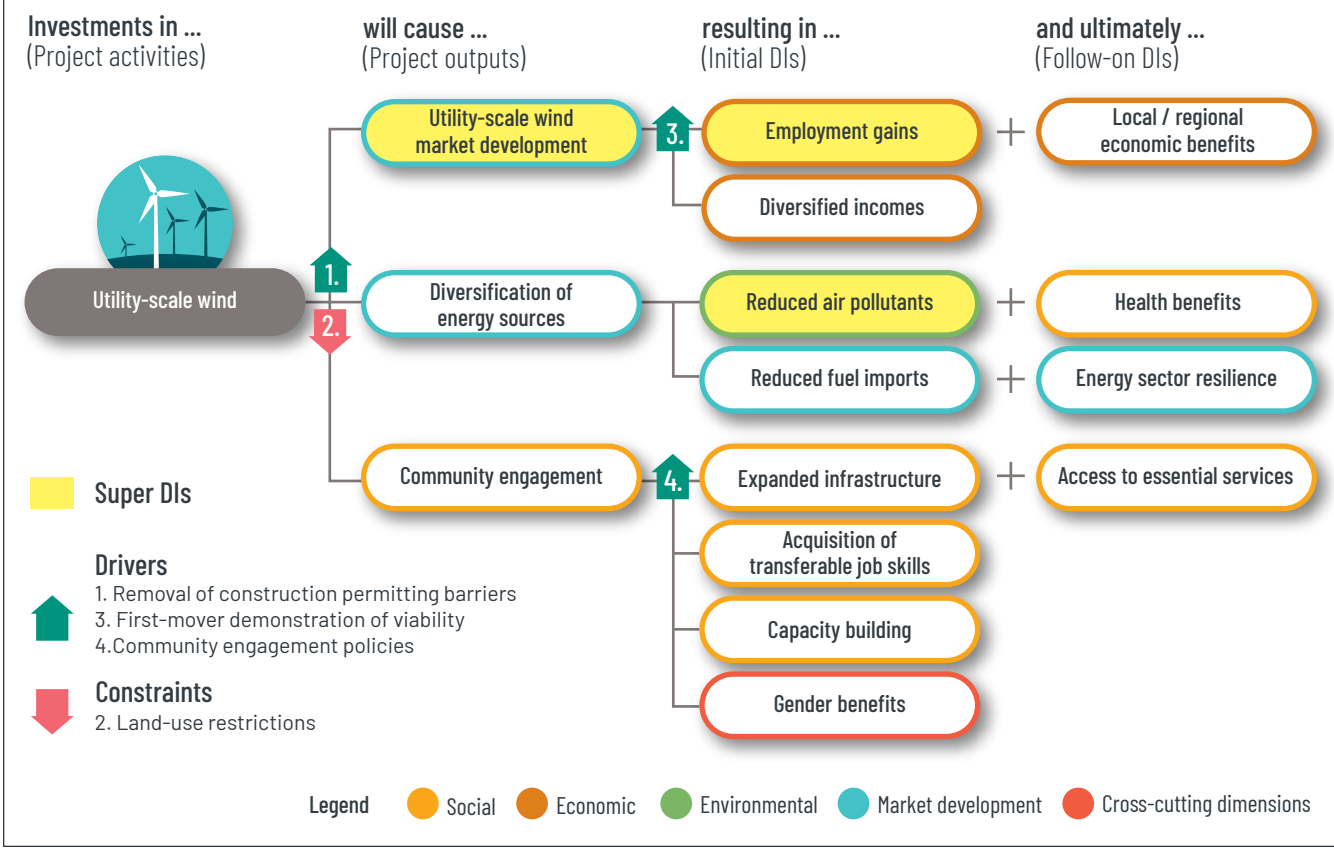
4 How have drivers and constraints affected the achievement of development impacts in your programs, projects, or policies?

5. SUPER DEVELOPMENT IMPACTS

The effect of DIs can be greater than the sum of the parts. DIs can be mutually reinforcing and act synergistically, producing greater benefits together than they could individually. We refer to these DIs as "Super DIs" because they are catalytic and influence the achievement of other DIs. Some examples of Super DIs include elements of market development, built capacity, social/gender inclusion, and local workforce development. Super DIs should receive careful attention during project planning and implementation to maximize DI results.

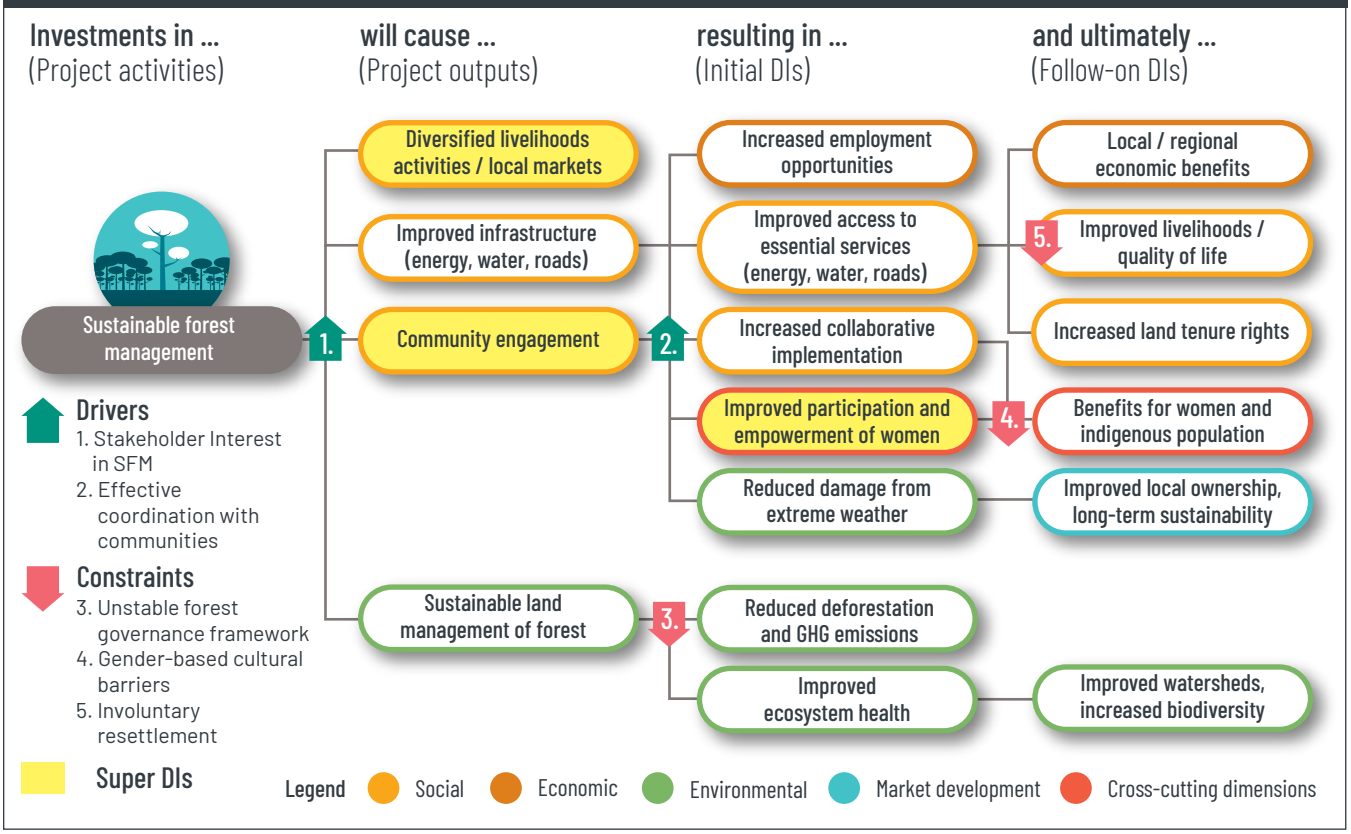
In the case of the Thailand utility-scale wind project, market development acted as a Super DI that resulted in significantly more health benefits from reduced air pollutants. CIF's concessional finance reduced the risk for first-mover, utility-scale wind projects in Thailand and demonstrated their financial viability. This, in turn, helped overcome the reluctance of domestic financial institutions to provide loans for these projects. Several privately funded, large-scale wind projects were installed after the initial demonstration projects without the need for concessional finance from CIF or an MDB. Resulting DIs, including reduced emissions and the health benefits of reduced air pollution, would likely have not been achieved in the same timeframe or at the same scale without the first-mover CIF-funded facilities. In Figure 6, the Super DIs are shaded.

FIGURE 6. Super DIs in Thailand's Utility-Scale Wind Project



In the sustainable forest management projects in Indonesia, gender and social inclusion acted as a Super DI for increased benefits for women and Indigenous groups. Women constituted at least 30 percent of participants in all workshops, consultations, trainings, and implementation activities. As a result, women participated in more economic activities and took on a larger role in conflict resolution within their communities. The development of local markets was also a Super DI in these projects. Improved access to markets, and thereby access to new activities and alternative sources of income, led to the creation of economic and employment opportunities as well as local/regional economic benefits. Super DIs are shaded in the Figure 7.

FIGURE 7. Super DIs in Indonesia's Sustainable Forestry Management Projects



Exercise:

1 | Based on your experience, which DIs have you seen act as “Super DIs”?

2 | Looking at your own impact pathway, which DIs have the potential to be “Super DIs” that influence the achievement of other DIs? Mark the Super DIs on your pathway page 10 and add the additional DIs that they influence.

6. MODELING APPROACHES TO ASSESS DEVELOPMENT IMPACTS

Now that your DI pathway is complete with drivers and constraints as well as Super DIs, we can shift our focus to measuring DI results using various modeling approaches. It is important to consider modeling approaches for assessing DIs at various stages of the project lifecycle in order to better refine investment plans and project designs, facilitate knowledge-based collaboration with partners, assess tradeoffs between investments, and conduct ex-post evaluation of climate finance DIs.

The CIF evaluation conducted a comparative analysis and testing of several modeling tools for estimating DIs in climate finance. Three categories of high-priority DIs were selected for a deep dive into potential modeling tools: 1) Improved air quality and resulting health impacts, 2) Increased climate resilience in agriculture, and 3) Increased economic value added/output, especially from additional energy generation. For more details on the process for the selecting these DIs, see the Modeling Memo.

Table 3 provides an overview of the modeling approaches assessed and tested for each high-priority DI. To determine which model would be applied, the evaluation team considered the following: (1) level of complexity as it relates to technical requirements for data, people, or computation in the context of CIF's capabilities; (2) in-house vs. outsourced use of the tool; (3) estimated costs of implementation and ongoing maintenance; (4) examples of where this tool has been used, by others or in CIF case studies as applicable; and (5) CIF primary use cases for modeling.

TABLE 3. Assessment and Testing of Modeling Approaches for High Priority DIs

HIGH-PRIORITY DI	MODELS REVIEWED	MODELS APPLIED IN CASE STUDIES	MODEL DESCRIPTION
Improved air quality and resulting health benefits	GEOS-Chem, LEAP-IBC, BenMap, Air Q+, COBRA, and FASST	LEAP-IBC applied to Thailand utility wind project case study	LEAP is a scenario-based modeling tool for energy policy analyses and climate change mitigation assessments. LEAP-IBC (Integrated Benefits Calculator) enables the analysis of energy-related emissions and the resulting health impacts.
Increased yields / climate resilience in agriculture	DSSAT, AquaCrop, EPIC, WEAP, APSIM, CropSyst, HERMES, and InVEST	AquaCrop applied to Bangladesh coastal agriculture case study	Crop growth model that quantifies biomass, crop production, and performance indicators in response to changes in water supply
		InVEST applied to Brazil sustainable agriculture case study	Calculates the effects of land cover conversion on pollinator abundance (in terms of changes of an index value) and potential changes in crop yield (also based on an index value)
Changes in economic output resulting from energy investments	Input-output and CGE models, such as GCAM, JIM, EPPA, GTAP, and ENVISAGE	GTAP-calibrated CGE model and JIM applied to Indonesia geothermal case study	CGE models capture all income and expenditures in an economy based on a social accounting matrix (SAM). They include supply and capacity constraints, a change in production structure coefficients, and other features. I-O models also use a SAM, but without the additional features of CGE models.

Exercise:

1 | Which of the DIs in your impact pathway are the highest priority for assessment? List 2-3 DIs below.

2 | For your selected high-priority DIs, are there any existing modeling tools in the public or private domains? This will require some research on how the selected DIs are commonly measured and what approaches have been used to measure the DIs in similar contexts. See Annex A of the Modeling Memo for an overview of modeling approaches mentioned in Table 3.

3 | Given your organizational needs and capabilities, what other considerations (e.g., level of complexity, in-house vs. outsourced, estimated costs, examples of uses of the tools, and primary use cases for the tool) should you keep in mind for selecting a modeling approach?

7. MEASUREMENT CHALLENGES

Measuring DIs can be challenging, but resources should be dedicated to measuring them effectively if there are priority DIs to assess. Some common challenges for measuring DIs, and possible solutions, are outlined below.

- **Missing regional or local datasets relevant to DIs:** Often local datasets, such as those on electricity grid mix, pollution, emissions factors, etc. are unavailable, making it more difficult to accurately estimate DIs such as reduced air pollution, health impacts, energy security, and resilience. Where available, global or similar country data can be substituted for local datasets. Projects can also make contributions to local datasets from their own monitoring and evaluation activities.
- **Long lead times to realize some types of DIs:** Some DIs, such as those associated with recovery of natural systems, may take several years to materialize, making it more difficult to show progress on an annual basis using simple metrics. For example, in coastal agriculture resilience projects, reduced saltwater intrusion on farms will likely gradually improve soil quality (and thus yields) over many years, but these benefits might not be fully captured in the project lifecycle. Thus, it is important to consider the timeframe of expected results and consider monitoring systems beyond the life of the project.
- **Substantial measurement work or modeling requirements:** Complex DIs, such as changes in agricultural productivity or improved health from reduced pollution, often require more substantial measurement work—for example regular yield sampling from both project and control sites. Projects that aspire to achieve complex DIs will need to consider data collection and/or modeling approaches that capture the level of detail required to estimate these DIs, ideally early in the project lifecycle and ensure that the necessary resources are allocated.
- **Lack of attention to gender-disaggregated data:** Even though project documents identify specific benefits for women, DI tracking is often not always disaggregated to monitor impacts to women. To resolve this, ensure that project baseline studies assess the pre-intervention situation for women and help to identify the correct DI metrics to monitor progress on a disaggregated level.
- **Measuring attitudinal or perceptional changes requires longitudinal data:** Understanding achievement of DIs, such as increased financial and energy literacy or the adoption of sustainable agricultural practices, requires a tighter methodological approach, such as pre- and post-intervention surveys of individuals' knowledge, skills, and changes in attitudes or perceptions. Where these DIs are important, longitudinal household surveys should be factored into project monitoring plans and costs.
- **Weak project data collection systems, or data sharing restrictions:** Meaningful monitoring and evaluation activities depend on robust data systems at the project and/or partner level. The evaluation found that in some cases, certain types of basic project data were omitted from data collection systems, such as the number of participants, land area covered, or employment figures. Data sharing restrictions can also be challenging, such as in cases where non-disclosure agreements between partner banks and their customers prevent the collection of data on project-finance investments. During project design, a review of priority DIs and their associated data collection requirements with all stakeholders can help to align systems and partners with the project's DI objectives.

BOX 1. Unintended Impacts

Unintended impacts are DIs (positive or negative) that were not anticipated by projects, as well as unexpected circumstances that influenced DI results.

In the evaluation, the most common unintended positive DIs were economic, especially economic value added and employment gains. Usually, these unintended positive DIs stem from other anticipated/intended DIs, which means that projects that take an impact pathway/theory of change approach to project design would be more likely to anticipate and track these important economic DIs. Other identified, but unmeasured, DIs included market access, regional economic benefits, the protection of critical habitats, and energy security.

Unintended negative impacts can sometimes occur. For example, involuntary resettlement may be needed, though project can take steps to address this negative impact in line with environmental and social frameworks, for example, by providing compensation and involving communities, women, and vulnerable groups in negotiations.

Precautions should also be taken to minimize impacts on physical and cultural resources.

Exercise:

1 | Which challenges do you anticipate facing in measuring the DIs in your impact pathway?

2 | What are some possible solutions to overcome these challenges?

3 | Looking at your impact pathway, do you foresee any unintended impacts, either positive or negative?

8. NEXT STEPS FOR MAXIMIZING DEVELOPMENT IMPACTS

Congratulations on creating your development impact pathway! This section provides guidance on how to maximize the DIs in your project or program. For more details on these recommendations, see Section 6 of the summary brief.

Maximize DI results via social inclusion and standards:

- Engage a range of stakeholders, including national and local government departments, external funders, implementing partners, to align on local priorities. Refine your DI pathway in collaboration with these stakeholder groups.
- Prioritize the Super DIs you identified in your impact pathway to influence the achievement of follow-on DIs. Ensure that budgets and resources adequately support Super DIs.
- Strengthen DI results at the local community level by building meaningful community engagement strategies throughout all stages of implementation and providing capacity building to support community participation.
- Increase the participation of women and marginalized communities as well as their distributed shares of DI results. Deploy inclusive, gender-responsive project design, baselines, and monitoring plans and assess potential risks and take steps to minimize negative impacts on women or vulnerable groups.

Maximize DI results via innovation and scaleups:

- Support learning and adaptive management and/or establish robust cases for sustaining, expanding, and scaling new or successful programs and projects. This can be done by supporting first-mover projects to demonstrate the business case for new or risky technologies, products, and practices and applying rigorous assessment and measurement methods during pilot initiatives.
- Increase the adoption of clean technologies and sustainable practices that lead to DIs. To do this, support innovative financing structures that are paired with outreach and capacity building.

Maximize DI results via DI intelligence:

- Enhance the quality and credibility of research and assessment methods, or build capacity for ongoing monitoring and analysis. This can be done by establishing partnership with local statistical and monitoring institutions, including governmental and academic organizations.
- Improve the measurement of and reporting on social DIs, such as food security, livelihoods, and quality of life, to better inform agricultural productivity and climate resilience initiatives. Test and deploy alternative methods, such as longitudinal household surveys, to measure important social DIs.
- Improve reporting on secondary DIs of energy investments, such as air quality and health impacts, by tracking and reporting actual clean energy production and the reduced use of conventional energy sources in renewable energy projects.
- Strengthen the business case for projects that provide ecosystem benefits and follow-on economic impacts. Ensure that project data systems track relevant field data, such as crop species yields, including baselines, to support the modeling of biodiversity and follow-on economic impacts.
- Gain broader and deeper insights into DI results that cannot be measured for more informed investment decisions, stakeholder engagement, or monitoring and reporting. Deploy more sophisticated tools such as modeling, especially for large projects or programs that have significant potential to generate DIs and meaningful learning about DIs.

Exercise:

1 | Which of the recommendations related to social inclusion and standards most resonate in the context of your project or program? Write down your next steps to actionize these recommendations.

2 | Which recommendations related to innovation and scaleups will you plan to take forward? Write down your plan to maximize DIs via innovation and scaleups.

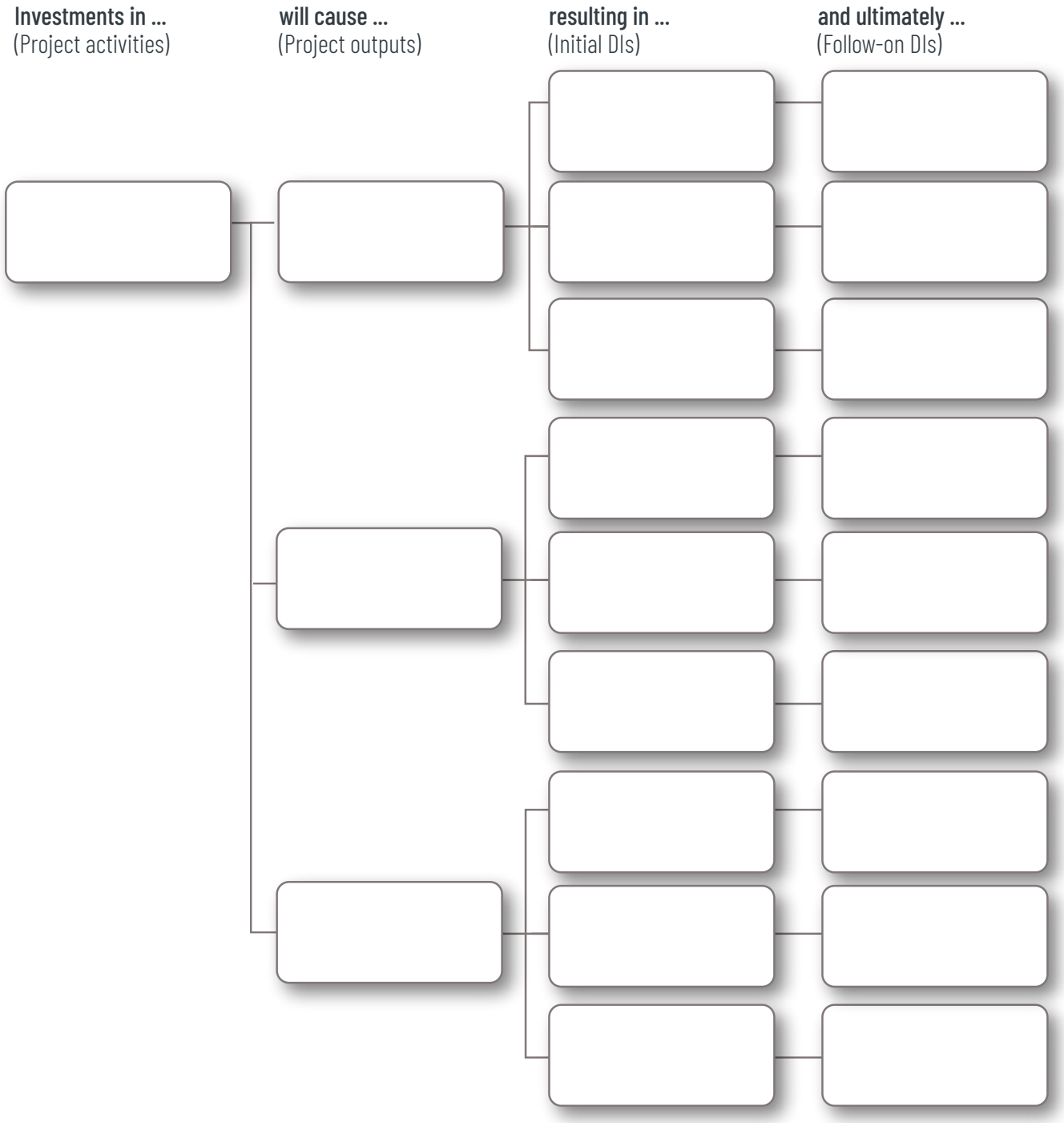
3 | How will you maximize DI results via DI intelligence? Write your next steps below.

4 | Finally, what other steps will you take to maximize your DI results that have not already been mentioned?

For further information, feedback, or suggestions, contact CIF's Evaluation & Learning Initiative at cifel@worldbank.org.

ANNEX 1: CREATE YOUR OWN DEVELOPMENT IMPACT PATHWAY

Additional space is provided below to map out additional DIs in your impact pathway.



THE CLIMATE INVESTMENT FUNDS

The Climate Investment Funds (CIF) is one of the largest multilateral climate funds in the world. It was established in 2008 to mobilize finance for low-carbon, climate-resilient development at scale in developing countries. 15 contributor countries have pledged over US$11 billion to the funds. To date CIF committed capital has mobilized more than $64 billion in additional financing, particularly from the private sector, over 70 countries. CIF's large-scale, low-cost, long-term financing lowers the risk and cost of climate financing. It tests new business models, builds track records in unproven markets, and boosts investor confidence to unlock additional sources of finance. Recognizing the urgency of CIF's mission, the G7 confirmed its commitment to provide up to $2 billion in additional resources for CIF in 2021.

CIF CLIMATE INVESTMENT FUNDS

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