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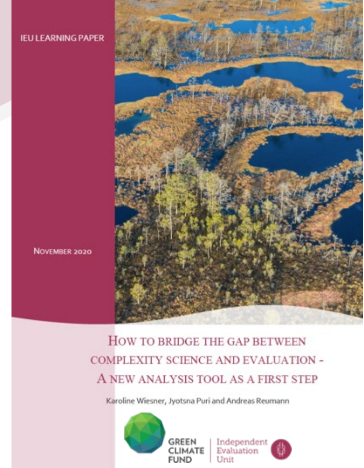

LEARNING PAPER SUMMARY:

How to bridge the gap between complexity science and evaluation: a new analysis tool

The IEU's Learning Paper Series fosters learning and discussion of climate evaluation, low-emission and climate-resilient development pathways. This 2-page summary provides an overview of the IEU's learning paper on bridging the gap between complexity science and evaluation.[1]

Background

Climate is complex. Investments in climate actions that intervene with social and ecological systems, such as projects by the Green Climate Fund (GCF), add to this complexity. The IEU learning paper summarized in this brief examines how complexity science applies to climate change and interventions. It presents a diagnostic tool to map interactions between funded climate activities and social-ecological systems to produce a complexity rating.

Features of complexity

By its own volition, a complex system can organize itself into a structured order. The order is produced by correlating the system's parts and feedback from the components' interactions. Also by its own volition, a complex system can move between structured orders. For example, an earthquake is a sharp transition between two stable tectonic states. Complexity is ubiquitous in natural, social and socio-technical systems. Other examples of complex systems are ant colonies, ecosystems and cities.

New diagnostic tool for social-ecological economic dynamic systems

The human–climate system is formed by humans and the planetary environment and consists primarily of the economy, ecosystems and human activity. Climate projects are interventions into areas of the human–climate system. These areas are smaller systems with their own economic, ecological and social components. The IEU learning paper calls these systems "social-ecological economic dynamic systems" (SEEDS) and introduces a diagnostic tool that helps identify SEEDS' components, interactions and processes. The tool is available to the GCF to help design, manage, and evaluate projects by clarifying the relevant dynamics and interdependencies of components and the results of feedback, non-linearities and other complexity features.

Implementing the SEEDS' diagnostic tool

The tool is implemented in three steps:

In step one, the relevant components of a human–climate system are identified and assigned to one of three main components, the "core systems." These consist of the resource, user and governance systems.

The resource system contains all the resources, for example, fish, parks or renewable energy. The user system includes entities that use the resources, such as farmers, households and companies. The governance system contains all the managerial components in the system.

Existing core systems are embedded in an environment that influences those systems, such as through climate or market conditions, but is itself unaffected by the core systems. The environment and core systems can also have subsystems.

In step two, the list of core systems, subsystems and variables is linked to a network of interactions. Initially, all variables that "interact" are selected. Two variables are said to be interacting if a change in the former is expected to cause a change in the latter.

In step three, the first two steps of the analysis are repeated. Planned interventions are included in the SEEDS. To assess a project's complexity, the assessment is conducted twice: once scoring the SEEDS of the system without the project interventions and once scoring the SEEDS with the project interventions. The difference in score is a measure of the project's complexity.

The learning paper posits that the diagnostic tool and the measurements it generates can guide a project's theory of change, design, management and evaluation by

[1] Tne citation for the IEU learning paper discussed in this brief is: Karoline Wiesner, Jyotsna Puri and Andreas Reumann. (2020). How to bridge the gap between complexity science and evaluation – A new analysis tool as a first step. IEU learning paper. November 2020. Independent Evaluation Unit, Green Climate Fund. Songdo, South Korea.

identifying and tracing project components that contribute to non-linear and sudden changes.

Using SEEDS' diagnostic tool at the GCF

The learning paper applies the diagnostic tool to three GCF projects. This summary examines its application to GCF **project 26 (FP026), Sustainable Landscapes in Eastern Madagascar**. This project addresses smallholder farmers' economic and ecological vulnerability in two remote areas of Madagascar. In these regions, farmers face extreme weather events due to climate change. They rely on their harvest for survival and often endure periods of starvation. Few to no safety nets exist. The farmers are isolated from major energy providers and depend on firewood. The GCF project addresses these issues by introducing sustainable farming techniques, providing information on sustainable farming, linking local food producers with the national market, investing in alternative energy suppliers and assisting start-up investments.

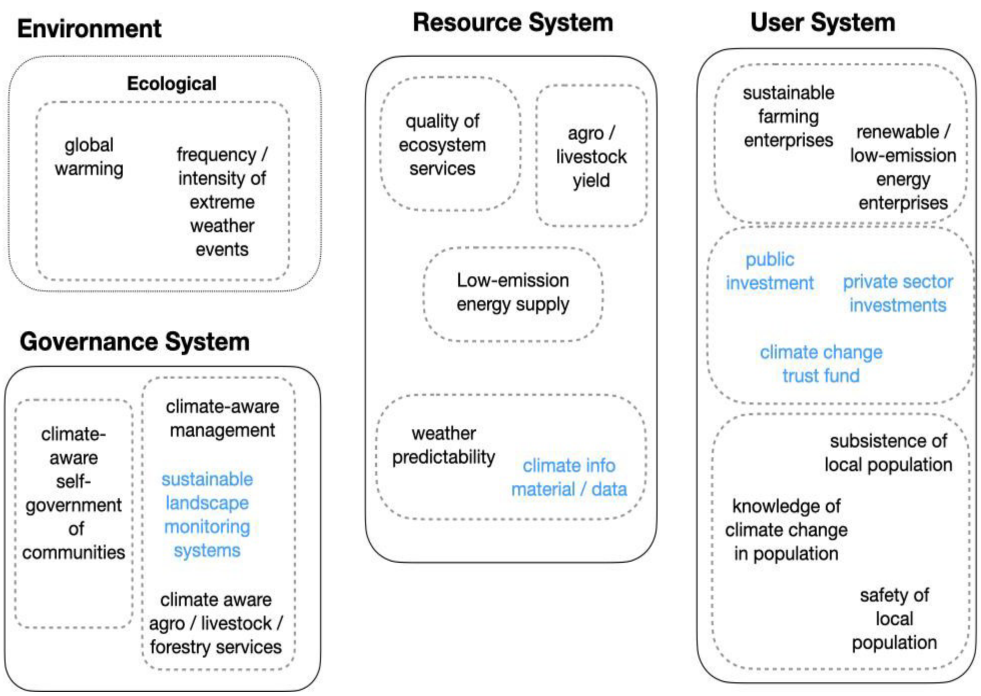

Figure 1 (above). Components of Madagascar SEEDS. NOTE: Dashed boxes are subsystems; items in blue are introduced by the project.

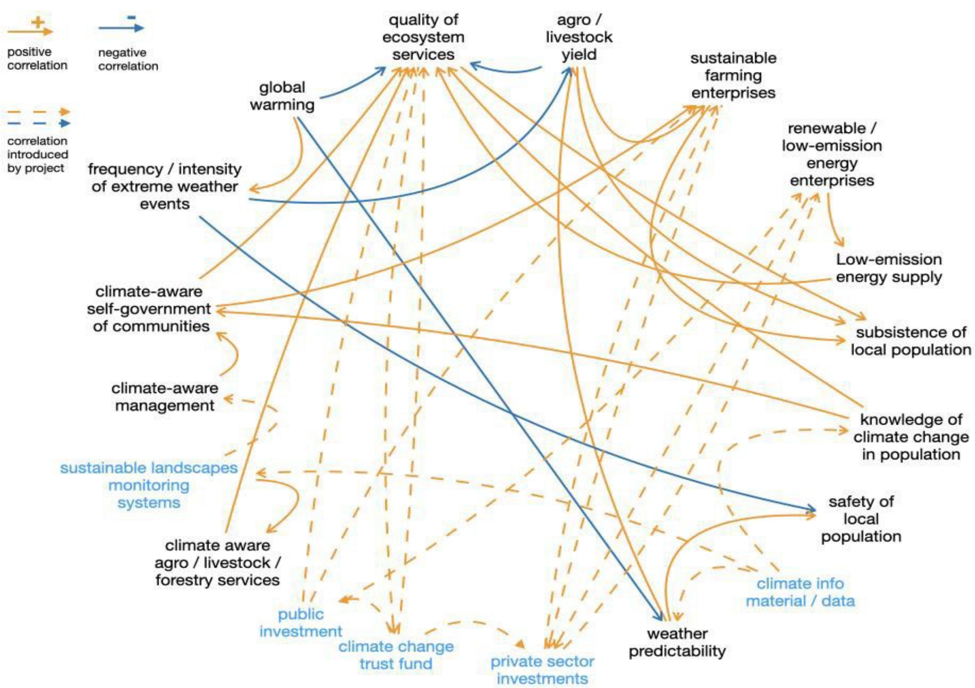

Figure 2 (above). Interactions of Madagascar SEEDS.

The Madagascar SEEDS consists of the earlier mentioned environment and three core systems: user, resource, governance, and their subsystems. Figure 1 shows the core systems' variables and subsystems and the environment's ecological component.

Figure 2 shows the full SEEDS representation as confirmed by the project's managers. In the figure, components in sky blue are introduced by the project. Orange lines and blue lines respectively indicate positive and negative correlations. Dashed lines indicate interactions newly introduced by the project.

Conclusion

Many uncertainties exist in the evolution of a complex system. Predicting their causes-and-effects is difficult, if not impossible. Thus, project management may encounter unexpected changes. Given that unexpected events are likely to happen but are difficult to predict, attempting accurate forecasts could be far-fetched and unrealistic. Nevertheless, using complexity tools such as SEEDS could help anticipate unknown extreme events and prepare for them with greater resource efficiency.