# Implementation Guide

## TO CEEWEB'S RESILIENCE ANALYSIS FRAMEWORK

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## to CEEweb's Resilience Analysis Framework

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Széher út 40, 1021 Budapest, Hungary

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## INTRODUCTION

In this guide we walk through the resilience analysis framework published by CEEweb and give practical advice for future users to help deliver higher quality results. Along with a general description of steps, we share experiences and common issues as well.

## THE GOAL OF A RESILIENCE ANALYSIS

A resilience analysis (RA) is usually done with some intention to change, develop to achieve a goal, or build capacities to cope with a threat. In our context, that of agroecosystems and a threat that is often but not always linked to climate change. The main strength of a RA is to uncover how various social, historical, or economic factors maintain the current challenging situation. After the analysis, it becomes clear how communities or institutions can play a role in solutions instead of just focusing on technical or ecological aspects in the narrow sense.

## STEP 0 – PREPARATIONS

The success of the workshop series depends heavily on preparations. The expert who is conducting a RA is often not intimately familiar with the system in question. It is important to talk with a few gatekeepers about what topics might emerge, who would be participating, how much conflict is to be expected, what previous scientific studies have been done in the area and, particularly, about the problem in question.

- Who is invited to the workshop? Can we make the participants more diverse? How can we involve more female participants, more people with

lower education, more people who have opposing views with the workshop organizers?
- Is there a specific problem that is known to all participants? Do they all share the view that this is a problem? Are there competing theories about the desired solution? Have there been failed attempts to solve the problem?
- What is their motivation to participate? Did they ever take part in a similar process?
- Logistics: how the workshop place looks, what equipment is available, are there language barriers, is there everything necessary to conduct a multi-day process?

## STEP 1 – STAKEHOLDERS

A stakeholder is anyone who is affected by the issues discussed, who is having an impact on them, or who is concerned about the future development of it. They might be farmers, subject-specific experts, local authorities, NGOs, etc.

In the first step, you list the most important issues and the stakeholders who are related to them. It is best to let stakeholders who are present express what is valuable for them and why is there an issue, but it is also important to think about absent people — ecological challenges are often contentious and people who are in conflict with the organizers, often miss workshops.

- This part might also serve as a content-rich personal introduction round which adds a lot to the analysis. This part usually gives very useful information as stakeholders share their views about all the relevant regulations, conflicts and ongoing debates.

## STEP 2 – SYSTEM BOUNDARIES

Where are the spatial boundaries of the system? In theory, the system can influence (to some extent) everything that is inside and is not able to change what is outside. For example, fishing pressure on a lake can be influenced by local legislation while climate change cannot be efficiently influenced on the local level. Sometimes, data or stakeholders are not available to work with the ideal boundary or some aspect of the issue (e.g. a piece of legislation that is framing the whole problem) defines another boundary. Administrative boundaries are often chosen for such reasons. Another good approach to defining boundaries is to look at the area where the stakeholders who are willing to act can influence the system (might be a group of neighbouring farms).

- If it is possible, it is very useful to take a paper map (can be a hiking map or similar) and let stakeholders draw boundaries and maybe also mark important spots or processes on it with a marker.

## STEP 3 – HISTORICAL TIMELINE

Creating a good historical timeline takes time. On the CEEweb workshops, they usually took a full day in total and ended up offering a significant amount of information. In other research projects, 2-3 hours were spent with this exercise and were fruitful as well. In a shorter timeframe, more moderation of the discussion is necessary. For a longer timeline, more time is necessary. Participants enjoyed constructing them much more than more abstract scientific tasks.

- Historical timelines always offer new information to all participants — even the most knowledgeable about local history can find new details. This makes this exercise very enjoyable for the participants.
- It is much easier to build consensus around history than around current issues. At the same time, historical development usually suggests causal relationships between events; thus, system dynamics can be understood without abstract discussions or heated debate.
- History is not deterministic: it is possible that something that happened in the past will unfold differently in the future. Think about that when the timeline arrives to present time: it is not necessarily obvious where processes lead.
- Timelines should be created on large sheets of paper with sticky notes or with similar but simple analogue equipment. There are digital tools as well, but large-size, physical timelines are facilitating conversations much easier. The result can be digitized later.

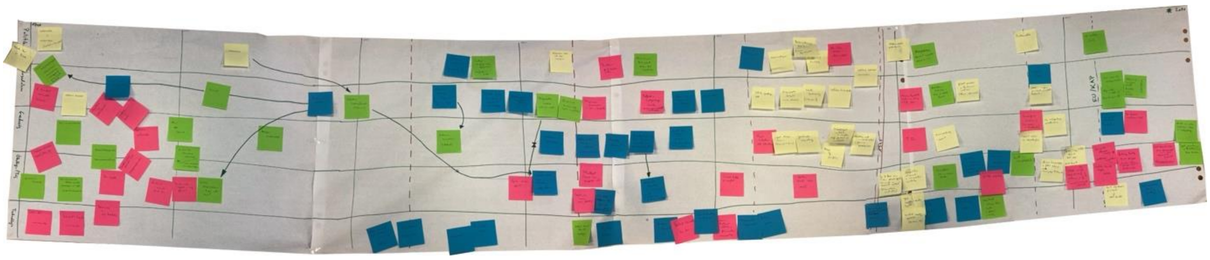

Figure 1. Panoramic picture of a 4-metre-long historical timeline from a resilience assessment in South-Eastern Hungary.

## STEP 4 – SLOW VARIABLES

Slow variables are the cornerstone of understanding resilience. Unfortunately, there is no formal way to define or distinguish them as every system is different and their definition and relations also depend on the context of the study. The best way to identify them is looking at the historical timeline and see what was largely constant but, when it did change, many other system elements changed as well.

- Participants usually have a hard time defining slow variables but that is not necessarily a problem. Usually, they collect more candidates than necessary and later during the discussion it becomes evident which is the real one.
- Stakeholders often interpret slow variables as "important" in their view and answer this question accordingly. Sometimes, subjective "important" factors indeed point towards variables that can be candidates for slow variables.
- If a slow variable is identified (or, in some cases, even anticipated before the workshop) it is especially useful to obtain time-series data about it. This is rarely possible, but when it is, it explains very clearly a large part of the questions in the assessment.

## STEP 5 – SHOCKS

Shocks are often discussed in detail during the historical timeline exercise. It is also possible to intentionally integrate this task with Step 3. At the same time, it is important to be explicit about the role of shocks, to discuss their frequency. It is helpful to directly ask about the three distinct types (systems' own variability, external known pressures, novel entities). Apart from making the average temperature higher, climate change usually has local effects that should be discussed.

- In agricultural systems, shocks often have standard responses. One example would be irrigation in time of drought or channelling water after heavy rainfall. These standard responses often cause problems on the long run.

## STEP 6 – THRESHOLDS

A simple version of step 6 is relatively straightforward, but creating an accurate version is almost impossible — one should aim for somewhere in the middle. It is immensely helpful to support this exercise with measured data, especially time series about slow variables. This information, however, is rarely accessible if it exists at all — since slow variables are often considered as constants. Thresholds cannot be predicted as multiple factors can trigger them and they have a partially chaotic behaviour. It is possible to judge trends and safe/risky intervals for the slow variables.

- The goal of the exercise is to consider the *existence* of thresholds and to talk about what is beyond them. Obviously, stakeholders would want to avoid crossing them. If a threshold is identified, case studies of crossing similar points in other agricultural systems might offer lessons to learn.

## STEP 7 – DISTURBANCE REGIMES

This part is similar to Step 5 and is also often discussed in the historical timeline exercise. Disturbance regimes — especially, changes in them — express the "old normal" and "new normal" when a system is transforming. After regime shifts, new challenges emerge, new disturbances become part of the everyday balance, and the rest of the system has to adapt to this. This has a psychological aspect as well: the new normal has to be accepted as something that is not "exceptional" anymore but part of the system — it has to find its place.

## STEP 8 – COMPREHENSIVE TABLE OF MANAGEMENT

Step 8 is a summary of earlier steps before turning to management issues and planning. It is possible to do this exercise in detail with stakeholders — in this case, slow variables should be considered one by one. Another option is to prepare the table based on earlier steps and show it to stakeholders asking for their confirmation or correction.

## STEP 9 – 10 – 11 ADAPTIVE MANAGEMENT

These 3 steps describe a discussion that can be structured in many ways depending on the timeframe, stakeholders' views and the results of all previous steps. Increased resilience is most often reached through some implementation of adaptive management — a management form where instead of evidence-based policy, hypothesis-based experiments are done. These tasks offer a formalized way to talk about possible futures and pathways to them.

- It is important that future scenarios should not remain elusive, but be realistic, step-by-step plans where every step expresses a clear development towards the end goal. Often, this is hard — or some steps seem to be impossible. Adaptive management offers for these occasions two ideas:
    - Try multiple solutions on small scale and see what works. This is also a tool to demonstrate to others that a strategy is working in small scale — so it should be scaled up.
    - Try as small as possible. This is to minimize conflict but becoming very convincing about the possible success of a strategy.
- This means that multiple solutions can be tested on a small scale — there is no need to find the "best" option based on anyone's expertise. Instead of

deciding, stakeholders have to agree on how they will assess the performance of the various solutions. Most likely, this will be some form of indicator of cost-efficiency and an indicator of side effects.

- There are always unknown factors. Data might be non-existent or inaccessible, some dynamics of the system might be unknown even for an expert scientist. Sometimes data is easy to collect, but nobody does it. Unknown factors are important because they hold risks in the future and generate resistance in the present — most people do not like to take risks with their livelihoods. Scientific studies or a monitoring programme often solves the problems of unknowns.
    - Citizen Science solutions fit very well adaptive management efforts. In a context that is best known by farmers, there is often no need for scientists to form hypotheses and test them — there are many examples when farmers do it.
- Make explicit forecasts about the expected outcomes within pre-defined timeframes. The goal of this is not to find who was right but to reflect on the understanding of the system as better understanding leads to better forecasts.
- Adaptive management should be started small and scaled up building on promising early results step by step.
- Adaptive management is an incremental but highly agile strategy. Besides the right monitoring tools, it is particularly useful to be explicit about the vision, the values pursued and the milestones that confirm that the project is on a right track. This is a process that is both about finding the most efficient strategy and about coming to an agreement for a common vision among stakeholders.

## STEP 12 – COST-BENEFIT ANALYSIS

Although doing this exercise quantitatively is immensely useful, this is not necessary the main goal. The objective here is not (just) an economic understanding, but human empathy-building via listing benefits and challenges for each of the stakeholders — present or not on the workshop. Reasons for resistance towards change, motivations to support one or the other group, or surprising short-sightedness in economic planning are usually all results of an economic and social situation. An efficient plan for changing the landscape should take into account in the project the "losers" and has to embed elements in the plan that support them while they have to change to a new, maybe expensive, perhaps unknown strategy.

- Stakeholders who can expect multiple benefits from the strategy will be likely allies. Stakeholders with much to lose or high risks might be on both sides, depending on their situation.
- This analysis, if done in a detailed and quantitative manner, is a great tool to advocate for some specific policy.

A resilience assessment is never fully done. Discuss the process with stakeholders, show the results, reflect on it, and review it in light of success and failure in implementation. Consensus building and curiosity are much more important than being right and decisive.