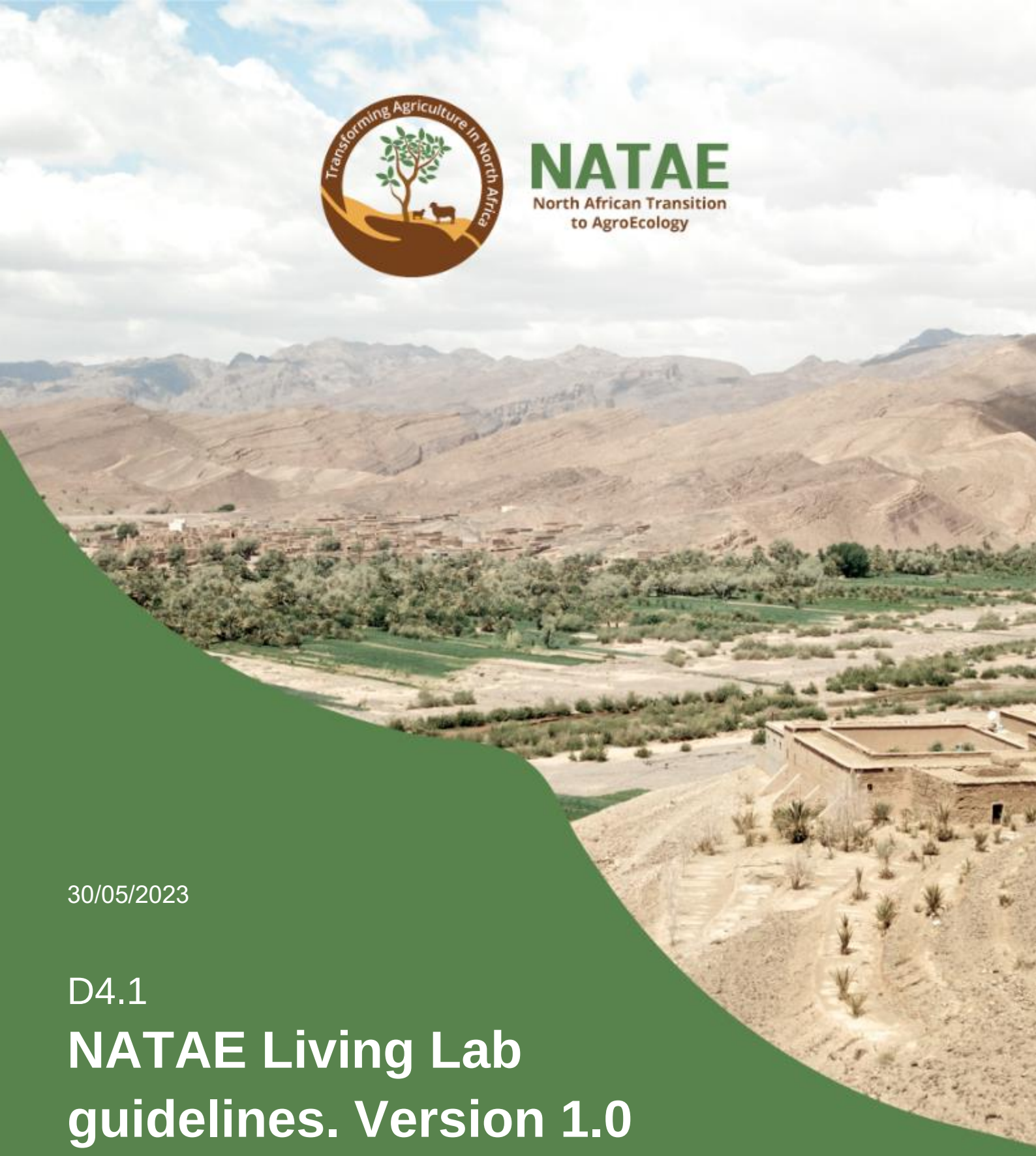

NATAE
North African Transition to AgroEcology

30/05/2023

D4.1

NATAE Living Lab guidelines. Version 1.0

www.natae-agroecology.eu

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Glossary

Abbreviation	Full form
AEP	Agroecological practices
LL	Living Lab
RL	Replication Lab

Concept Category	Concept	Explanation
Living Lab methodology	NATAE Living Lab	Self-organized places of structural exchange between food system actors on the identification and testing of combinations of agroecological practices while working towards a joint vision for and implementation of an agroecological transition. A preliminary social and geographical delineation is provided in this document.
	Food system actors	Actors active in agricultural production (e.g. farmers) and/or the food value chain (e.g. consumers) and/or the formal institutions (e.g. local governments) that play a decisive role in agricultural and value chain activities.
	Stakeholder group	A group of LL actors with similar stakes and perspectives regarding the food system. Relevant stakeholder groups will be identified in each LL independently.
	LL-representative board	Group of about 10 persons that represent the different relevant stakeholder groups in regular meetings regarding the governance of the LL.
	LL-leader	NATAE partner organization that has been assigned with organizing and monitoring the LL process and reporting on its activities.
	LL-facilitator	An individual from the LL-leader organization or from a locally embedded organization which is hired by the LL-leader, who facilitates the Living Lab interactions. The LL-facilitator will be part of the LL representative board.
Supporting methods	Systems analysis/ systems thinking	A method to deal with complexity and uncertainty in analysing systems: systems are always more than the sum of their parts; systems consists of interrelated sub-systems. Defining the system boundaries is essential.
	Reflexivity	This refers to the conscious and active acknowledgement of one's own assumptions and judgements and how these influence the research process.

Stakeholder activities	Data collection survey	Data collection through implementing a (semi-) structured questionnaire with individuals. A questionnaire can be answered in an interview or in written form.
	Expert interviews	(Semi-)structured conversations with experts to gather data and insights that are mainly qualitative in nature. What is considered an expert depends on the specific topic that is studied. Experts can belong to a specific stakeholder group or be actors outside the LL.
	Focus group discussion	Discussions with 5-10 representatives of a specific stakeholder group.
	Stakeholder workshop	Workshop for which members of all relevant stakeholder groups are invited to participate. Sometimes only specific stakeholders may be targeted (e.g. in farmer workshops)
	LL representative board workshop	Workshop for which only LL representative board members are invited

Executive Summary

This document provides a starting point for the organization of NATAE Living Labs (LL) in North Africa. NATAE Living Labs provide an innovative governance structure for agricultural research and agricultural systems to identify, test, adapt and scale-up combinations of agroecological practices (AEP) in an uncertain and complex real-life context.

In Chapter 1, an introduction is presented regarding the context, aim and target audience of this document. An introduction to the concept of Living Labs is presented in Chapter 2. Chapter 3 proposes a methodology to set-up, run and monitor Living Labs in the context of NATAE. In NATAE, we intend to evolve from a provider-driven Living Lab, where activities are primarily organized by researchers, to a user-driven Living Lab where activities are primarily organized by local actors. A combination of individual-centric, system-centric and network-centric approaches will be employed to capture different stakeholder perspectives at different levels in the Living Lab.

Stakeholder activities for identifying, testing and scaling-up AEP combinations are detailed in Chapters 4 and 5. At first, activities with an emphasis on describing and explaining the system will be implemented: a territorial diagnosis, a farm household characterization, and value chain assessments, current policy evaluations, and diverse activities organized around the launch of the Living Labs. Subsequently, stakeholder activities will gradually put more emphasis on exploring and re-designing the system: participatory visioning and backcasting exercises, co-design of experiments to test promising combinations of agroecological practices (AEPs), which include amongst others new organizational and institutional arrangements, innovative business models, new ways to share knowledge, and co-design of policy options.

The Living Lab guidelines are a living document as they adapt to the real-life context of LL and the NATAE project. The approach will, therefore, continually be revised based on input from project partners and LL-stakeholders.

Chapter 1

Introduction

Chapter 1 – Introduction

1.1 Context of this document

These guidelines are developed in parallel to and in interaction with the multidimensional, multiscale evaluation framework (D1.1), the integrated modelling chain (D2.1) and the methodologies for assessing value chains (WP3) and policies (WP6). Continuous interaction between work packages will ensure that the overall methodology and its implementation serve the development of optimal combinations of agroecological practices (AEP) and bringing them to scale in the North African context.

The Living Lab (LL) guidelines are a living document as they adapt to the real-life context of LL. The approach will, therefore, be continually revised based on input from project partners and LL-stakeholders during and after the implementation of activities. Intermediate updates are foreseen each time a specific NATAE project task is finalized. This will for instance provide more clarity on participation of specific stakeholder groups in the LL. Major updates are foreseen halfway and at the end of the NATAE project.

The guidelines will guide, not dictate, based on common agreements among NATAE partners and Living Lab actors. Therefore, while the "spirit" stays the same in all LL, some differences can appear in implementation due to the real-life context of a specific LL (partnerships, local policies, technical constraints, cultural stakes, etc.). **Input on the guidelines is most welcome at any stage of the project.**

1.2 Aims and direction

The LL guidelines aim to convey the "spirit" of a living lab and to provide practical information (e.g. when, what, why, where, by whom?). **The role of WU is to provide starting material for further discussion and help navigating the various wishes and needs of farmers and other LL-actors (e.g. need for specific knowledge or resources), LL-leaders (e.g. need for flexibility) and WP- and task-leaders (e.g. comparable approaches across LL) (Figure 1)**. On behalf of the NATAE consortium, **WU aims to moderate the discourse on both the academic requirements in action research and the more practical requirements for functional Living Labs**. In the Living Lab, science will be at the service of LL-actors, which is why research activities should foster stakeholder engagement while staying within the limits set by academic standards. Having relative short stakeholder activities, for instance, may avoid stakeholder fatigue and encourage continued stakeholder engagement, which is important for both data quality (academic standards) and longevity of the Living Labs (requirement for functional LL).

These guidelines will be regularly updated during the course of the NATAE project. A synthesized version of these guidelines will be integrated in the NATAE Guidebook (D1.3). This will include a methodology to identify AEP combinations, test their performance and assess their potential for scaling-up and scaling-out. It will also include an assessment for evaluating the governance process in the Living Labs in a cross-comparison across the six NATAE Living Labs.

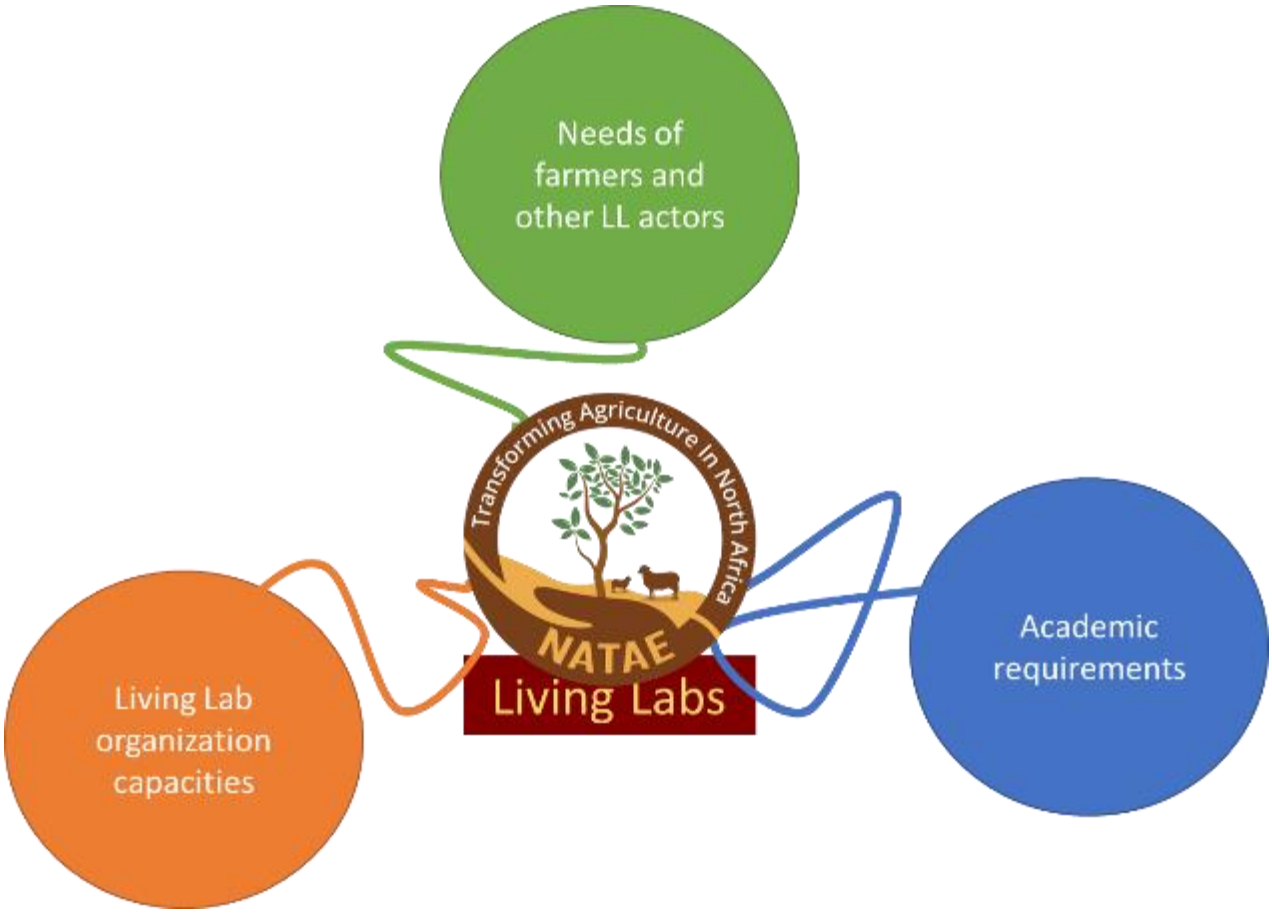


Figure 1 – Navigating and unifying the needs of LL-actors, LL-leaders and research partners in NATAE Living Labs.

1.3 Target audience

The primary target audience for this document are the LL leaders. This document provides a theoretical (Chapter 2) and practical (Chapter 3) **introduction to Living Labs** and an **overview of stakeholder activities** that need to be organized in their Living Lab (Chapter 4 and 5). Chapter 4 presents the stakeholder activities for WP4. Chapter 5 provides details on stakeholder activities that are conducted in the context of WP6 on promising AEP combinations and the barriers and opportunities to adopt them. Chapter 5 also provides information on WP5 on networking, capitalization and dissemination of project results and WP7 on education and training. Chapter 6 provides some preliminary conclusions.

Chapter 2

Living Labs

2. Introduction to NATAE Living labs

2.1 NATAE Living Labs and Replication Labs

NATAE Living Labs aim to provide an environment for co-construction and learning regarding the identification and implementation of agroecological practices, agroecological combinations and policies supporting an agroecological transition. Central in the Living Labs are the dialogues between key stakeholders (Leminen et al., 2012), including farmers, farm household members, industries, governments, NGOs, consumer organisations, research institutions and local advisory services.

The territorial delineation of a NATAE Living Lab is constructed through three complementary dimensions (Di Méo, 1998): 1) an identity dimension related to common knowledge, practices and history in their social context, 2) a material dimension related to the agroecological conditions regarding soil, climate and ecosystems, 3) an organizational dimension related to the social and institutional organization, that, in the context of NATAE, include at least one producer organization and where at least one commodity produced with agroecological practices[1] could be integrated in local or international value chains[2]. NATAE Living Labs operate at the level of a community, e.g. a village, or a set of communities (e.g. multiple villages along the same river), i.e. they fit within institutional boundaries. The selection of the community/communities depends on their representativeness for the agricultural system in the wider region around and the willingness of local actors to collectively identify and test agroecological practices. **Farmers are the starting point and a focal point of attention for NATAE Living Labs.**

In North Africa, there are five main agricultural systems, and each of them is represented by one LL (Figure 2; see Appendix A for more details) and one or more replication labs (RL):

1) Oasis and Peri-Oasis systems (FAO: Pastoral / Sparse arid):
    a. **LL Laghouat, Algeria**
    b. RL Kebili, Tunisia
    c. RL Atar, Mauritania
2) Cereal plains (FAO: Rainfed mixed):
    a. **LL Siliana, Tunisia**
    b. RL Setif, Algeria
    c. RL Saïss, Morocco
3) Irrigated valley or plain (FAO: Irrigated):
    a. **LL Luxor, Egypt**
    b. RL Kafr El Sheikh, Egypt
4) Mountains (FAO: Highland mixed & Rainfed mixed):
    a. **LL Boulemane, Morocco**
    b. RL Tizi Ouzou, Algeria
5) Peri-urbain (FAO: Sparse arid and Rainfed mixed):
    a. **LL Meknes, Morocco**

[1] Although the framework (D1.1) provides guidelines for defining agroecological practices, we should also acknowledge that this is work in progress to which NATAE is contributing in a Northern African context.
[2] A more detailed description of the Living Lab dimensions is available in NATAE project document.

b. LL Nouakchott, Mauritania
c. RL Western, Northern and Eastern Cape provinces, South Africa

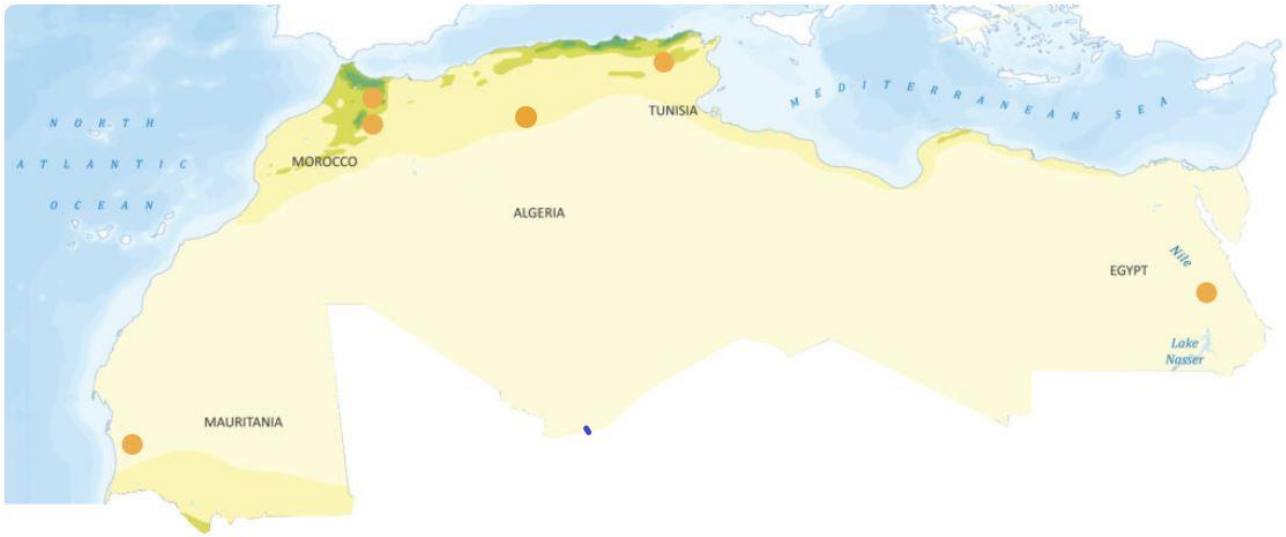


Figure 2. Northern African region with the geographical location of NATAE Living Labs (orange dots). Source: natae-agroecology.eu.

LL were selected based on 1) the existence of previous projects in the domain of sustainable agriculture and /or pre-identified AEP and associated local knowledge, and 2) existing local dynamics and organizations working on improving agriculture and its natural and socio-economic context.

The Replication Labs will be used to test the replicability of certain methodologies and results from Living Labs. The approach in RL will be less demanding than in LL regarding data requirements and research efforts. The focus in several of these RL will be on model-based studies (WP2) which outputs are envisioned to fuel local debates and decision making regarding the implementation of AEP combinations.

2.2 Concept and approach of Living Labs

Laboratory approaches in social-ecological systems (SES) have originated in the context of systems thinking and innovation research, in which researchers and societal actors are usually confronted with high degrees of complexity and uncertainty (Westley et al., 2015). Currently, different laboratory approaches exist, such as the real-world lab (Schäpke et al., 2018), the urban transition lab, the transformation lab and the social innovation lab (Westley et al., 2015). What these have in common are “contribution to transformation, experimental methods, transdisciplinary research mode, scalability and transferability of results, as well as scientific and societal learning and reflexivity” (Schäpke et al., 2018). The transdisciplinary approach combines knowledge from different disciplines and societal actors into a co-design, co-production and integration of innovations in SES. Practically, experimentation contributes to the transdisciplinary approach with knowledge in the form of empirical evidence, while also providing a learning space to those who are involved in the experiment. Scientific and societal learning and reflexivity contribute with knowledge regarding the sharing of perspectives and finding ways to collaborate across disciplines and societal groups (Schäpke et al., 2018). In this document we refer to this process as co-learning. Combining knowledge in a transdisciplinary and co-learning approach is needed to ensure scalability of agricultural innovations (see e.g. Schut et al.,

2015). Scalability of innovations is a prerequisite for the long-term transformation that Living Labs envision.

1 / Living Labs are a practical answer to the many uncertainties surrounding the identification and uptake of innovations in SES. Through co-development and iterative improvements, innovations are more likely to meet user preferences and needs, which makes them ready for scaling-up and scaling-out (Beaudoin et al., 2022). In NATAE Living Labs, for instance, agroecological practices already exist, but often these practices are not permanently adopted at a wider scale because of a lack of resources, inappropriate management and/or lack of public support (Boughamoura et al., 2022).

2 / Living Labs can also serve to bridge diverse stakeholder views and needs and to function as a focal point for coordinating the agency[3] of individual stakeholders. In agricultural systems, for instance, a centralized agency to steer the sustainability agenda at regional level is generally absent (Feindt et al., 2022). In the context of NATAE, Living Labs will take up the role to coordinate the agency of individual actors in order to test, scale-up and scale-out innovative agroecological practices for improved sustainability. Studies in the ecological domain show the potential of how participatory approaches can evolve towards a coordinating, multi-actor entity for ecosystem management (Biggs et al., 2010). It should be noted, however, that besides the need to strengthen the voice and agency of LL-actors, success of a LL also depends on the transfer of discretionary power from higher-level authorities to local representative authorities (Ribot, 2004).This is one of the reasons why LL in themselves cannot bring about the change without also reaching out to actors that are not included in the LL-process (Schäpke et al., 2018). In NATAE, we will address this, amongst other activities, by developing the multi-actor network MEDAE, preparing and disseminating policy briefs, and organizing high-level policy events.

In summary, Living Labs are designed to study, test and scale innovations in real-life contexts. At the same time, they are a social innovation in themselves through changed interactions between stakeholders (Leminen et al., 2012). This social innovation, that Living Labs are, relates to responsible governance, which is an important element in agroecology (Barrios et al., 2020). The underlying assumption in NATAE is indeed that introducing LLs will lead to effective governance mechanisms at different scales in the food systems under study.

Living Labs come in many shapes depending on the driving force behind it (Leminen et al., 2012). NATAE focusses on establishing Living Labs for the long term, extending beyond the duration of the project.

At the start of NATAE, the Living Labs will predominantly be “provider-driven”, meaning that Living Labs are organized around the NATAE research partners with their research, problem definitions, theories, and knowledge. Eliciting stakeholder responses for the aim of data extraction by (local) researchers is possible, but should be complemented with rapport building with local stakeholders (see e.g. Mosse, 1994). Such rapport building will enable to build trust and capacity to discuss sensitive topics, address tension and work towards a collective vision for action. At some point, rather sooner than later, the process should shift towards “user-driven” Living Labs, where local actors self-organize around their own values and needs utilizing the information provided. This requires flexibility to adapt methodologies to the specific Living Lab context. In a user-driven Living Lab, value is primarily created for Living Lab actors, and not so much for the researchers involved. Local researchers, e.g. the LL-leader and LL-facilitator, will assist in facilitating and moderating the LL-process and will further participate in the Living Lab based on locally defined needs. External

[3] As working definition for agency ‘the influence and power of actors to impact their situation’ is used. Influence and power relate to the material and immaterial resources that actors have at their disposal.

researchers will be in an observant and assisting role. Local and external researchers are together responsible for ensuring scientifically sound approaches to be able to scale out innovations.

In the NATAE context, Living Labs deal with two important uncertainties: the uncertainty on the adoption of AEP combinations by farmers and the uncertainty on the perception, knowledge and ultimately acceptance of the (agroecological) products by consumers. Uptake of AEP combinations by farmers largely depends on the natural (e.g. soil type, access to water, vegetation) and socio-economic (e.g. resources, status, land rights) context of farms, which can be quite diverse. Focussing on agroecological practices increases the influence of the natural context as compared to industrial practices, as it implies a greater reliance on natural elements and processes and a reduced role of anthropogenic inputs that can mask differences in the natural environment between farms. Moreover, the socio-economic situation of farmers and the generally small farm size in NATAE LLs pose barriers for the necessary on-farm experimentation and fine-tuning of agroecological practices to the natural context. NATAE envisions to identify multiple combinations of agroecological practices and provide risk-free opportunities to test them together with farmers, thus enhancing the possibility for farm-specific fine-tuning related to their socio-economic and natural context.

As a working definition, we can argue that **NATAE Living Labs and replication labs should become self-organized places of structural exchange between local food system actors on the identification and testing of combinations of agroecological practices while working towards a joint vision for and implementation of an agroecological transition.** To get to this, Living Labs will at the start be structured and facilitated by local and external researchers through co-learning and co-creation processes. Practically, during the NATAE project, LL will produce qualitative and quantitative knowledge regarding the identification, testing and evaluation of AEP combinations, scaling them up (and out) within LLs and scaling them out (and up) within RLs. Scaling-up implies that AEP combinations will be improved in quality, e.g. go to the “next level” by further integrating AEP combinations in the farming system, while scaling out to RL implies increased dissemination and adoption of the identified AEP combinations, i.e. “more of the same” (Wigboldus and Leeuwis, 2013). The homogeneity of the area in the LL and the existence of local dynamics (section 2.1) are important factors for success of scaling-up and scaling-out. Obviously, scaling up to the “next level” and scaling out “more of the same” are not mutually exclusive and could reinforce one another. Also in RL, where the emphasis is on scaling out, AEP combinations need to be improved in quality through adaptation to local conditions.

2.3 Defining characteristics of NATAE LLs

Living Labs can be characterized by their aims, context, activities and participation (McPhee et al., 2021; Steen and van Bueren, 2017). In the previous sections, the context of NATAE LL is provided. In the text below, the aims, activities and participation of NATAE Living Labs are presented.

2.3.1 Aims

The overall aim of NATAE Living Labs is to support and effectuate the transition to sustainable and resilient food systems. NATAE proposes to achieve this through assisting local actors in identifying, testing, scaling-up and scaling-out locally adaptable agroecological practice combinations. These combinations include agroecological practices at field, farm, landscape and value chain levels and in enabling policies. Implementation of those combinations is expected to contribute to the transformation towards socially acceptable, economically viable and environmentally friendly food systems in the long-term.

To achieve this aim, NATAE LLs are based on co-learning, co-design and systems thinking. These methodologies are essential to identify, test and scale AEP combinations. At the same time, they

enable the dialogue and exchange of perspectives between stakeholders, and stimulate the emergence of a “user-driven” Living Lab that accommodates primarily for the values and needs of local actors.

2.3.2 Activities and participation

Stakeholder activities in the Living Labs will be conducted in the context of WP4 tasks and related tasks in other work packages. This structure is somewhat paradoxical with the self-organizing nature of “user-driven” Living Labs that NATAE is aiming at. Throughout the NATAE project, NATAE consortium members need to stay aware of this uncomfortable position where project requirements need to be addressed while leaving room for self-organization in the Living Labs. Clear communication will be key in this balancing act, assuring LL stakeholders that data extracting activities at the start, lead to meaningful support for the LL later on.

Stakeholder activities with a relatively large emphasis on data extraction (T4.2, T4.3, T4.4 and some WP6 activities) largely take place in the first one and a half year of the project. Those activities comprise interviews with key stakeholders, farm household surveys (max. 2 hours), focus group discussions with a limited number of participants (5-10) from one stakeholder group, stakeholder workshops including participants from all stakeholder groups (20-30 participants), and LL representative board workshops including key representatives from stakeholder groups (8-12 members).

For social learning purposes, individual-centric, network-centric and system-centric approaches will be used. Individual-centric approaches are inward looking and will provide insights in stakeholder perceptions and motivations (Harvey et al., 2013), e.g. during interviews. Network-centric and system-centric approaches are outward looking, interaction-oriented and are more suitable for long-term visions and planning collective action (Harvey et al., 2013), e.g. during participatory activities such as stakeholder and LL representative board workshops. Individual-centric approaches are better suited to elicit individual thoughts, feelings and experiences compared to participatory activities (Hollander, 2004), which are usually used in network- and system-centric approaches. Individual thoughts, feelings and experiences are important for understanding individual’s decision making. This information adds meaning to outputs and outcomes of more outward looking stakeholder approaches, i.e. from stakeholder workshops. In the context of NATAE, inward and outward approaches are needed to understand the uptake and spread of agroecological practices.

To have a lively LL, bottom-up approaches that allow for influence of all stakeholders, interaction and relationship building are preferred over top-down approaches that emphasize on data extraction. To enable co-design of research, the mere communication of existing external research results cannot be considered as a participatory activity (Harvey et al., 2013) In NATAE, several top-down approaches (surveys, workshops emphasizing on data extraction) are implemented to serve the data requirements of the integrated modelling chain (mainly T4.2, T4.3 and T6.2). This is something that can be clearly explained in words to stakeholders, but these top-down approaches should also be compensated for during the other LL-activities. Model results should, for instance, be used to fuel discussions about specific options and their potential economic, social and environmental impacts. **As a point of departure, at least 50% of time and LL-activities should be dedicated to bottom-up approaches**. These bottom-up approaches can be implemented in T4.4, T4.5, T4.6 and T4.8. Organizers of stakeholder activities related to T4.2, T4.3 and WP6 are encouraged to come up with ideas that make their approaches connected to the maximum extent with bottom-up objectives. Also the tailor-made professional trainings in the Living lab context (T7.3) will also provide a bottom-up approach.

Given the importance and urgency of the research theme in combination with high degrees of uncertainty, a post-normal approach to science is required (Ravetz, 2002). This means that a considerable part of our recommendations will be based on stakeholder perspectives, and not so

much on what we call “facts” based on “normal” science. One of the issues of working with perspectives is that activities with stakeholders, such as workshops, are extremely difficult to replicate. Also the representativeness of participating stakeholders is an issue. The involvement of a LL representative board may improve representativeness and reproducibility somewhat, but not fully. As researchers/scientists we have the responsibility to combine perspectives with hard data. In particular regarding the real impact of agroecological practices in social, economic and environmental domains, for which evidence is still scattered (Levard et al., 2019). Combining perspectives and hard data (e.g. from field experiments) will help navigate the demands from society (need for sustainability transition in LL) and science (compliance with academic standards; cf. Figure 1).

Chapter 3

Setting up and running NATAE Living Labs

3. Setting up and running NATAE Living labs

3.1 Delineating the LL boundaries

3.1.1 Social delineation

The social delineation of the LL is dependent on the social delineation of the farming system and connected food system under study. The social delineation of the farming system is defined as the farmers and all other local actors (local NGOs, veterinarian, local market manager, cooperatives, etc.) that have a mutual influence on one another in a homogenous natural context. Food system and value chain actors that directly influence the farming system (e.g. regional policy makers, regional/national food processors) are also included in the LL process. Food system and value chain actors that only indirectly influence the farming system (e.g. consumers outside, national financial institutes) are not included in the LL process, but may be consulted to shed light on the AEP combinations that are tested in the LL.

The social delineation of the LL should be started by LL-leaders and LL-facilitators to organize a LL representative board (section 3.2). Throughout the project, LL-leaders, LL-facilitators and the LL representative board can evaluate the need of including new actors, when deemed necessary from an economic, social or environmental point of view (e.g. environmental NGOs, marginalized stakeholder groups). In addition, to prevent a “continued status quo”, they also need to involve actors with creative thinking skills and a relatively neutral stake in the LL (Enfors-Kautsky et al., 2018; Paas et al., 2021a), e.g. local consumers, the local market usher, retired persons.

3.1.2 Geographical delineation

For practical reasons, the LL cannot cover the entire geographical area of the farming system under study. It would, for instance, be very challenging to involve a representative group of farmers that are spread over a large area. The geographical delineation of NATAE LL will thus often be at the communal level. In some cases, a set of communes may be selected. The selected commune(s) should be homogenous in natural and socio-economic context and be representative for the opportunities and constraints of the larger farming system under study. During the household characterization (section 4.1.2), a workshop will accommodate for confirming the (relative) homogeneity and representativeness of the selected commune(s). The selection of a specific commune may be influenced by the fact that agroecological combinations of practices, or ancient local practices that could qualify as such, have already been identified and tested with support of local public organizations or projects.

3.2 Organizing a LL representative board

In the period from May till September 2023, Living Lab leaders work on the construction of a LL representative board. The LL representative board is needed to build the foundation for intentional change (Enfors-Kautsky et al., 2021) in NATAE action-oriented research. A considerable amount of time and effort is required to build a representative board to ensure that transformative change can take place (Enfors-Kautsky et al., 2021). An example letter to invite individual LL representative board members is provided in Appendix B.

The representative board consists of 8-12 people who represent the diversity of stakeholder groups in the LL. Stakeholder groups need to be identified by the LL-leader, amongst others based on the

results from the territorial diagnosis (Section 3.1.1). Stakeholder groups could be visited individually to confirm the list with identified groups. Representativeness will be primarily guaranteed by a stakeholders' willingness and communicative skills to represent their stakeholder group (see also the paragraph below). No elected representativeness is foreseen in the course of NATAE, but the option will stay available in case the self-organization of LL-actors takes shape into that direction. Farmers form the central stakeholder group and ideally take a leading role, e.g. by being involved in organizing stakeholder activities. Other important stakeholder groups, such as the private sector and government organisations, are also present in the representative board, but they are encouraged to take an advisory rather than a leading role. For instance, they could be instructed to enlighten discussions in an advisory role where the primary input comes from farmers. Another option is to invite them at a later stage of the process (see e.g. Chambers et al., 2022). At the same time, it is of particular importance that the Living Lab respects the existing discretionary power of local representative decision makers (Ribot, 2004). See section 3.5 for ideas on how to moderate the participation of different stakeholder groups. Large and diverse stakeholder groups, such as the one for farmers, may need to be split into multiple groups, with each a LL representative board member, to ensure that the diversity is represented. In the case of farmers this is very important as they will be the final users of different AEP adapted to the diverse local farm conditions.

LL representative board members will be selected based on their knowledge, connections and influence/power regarding decision making in the LL-territory and connected value chains. They need good facilitation and communication skills and are willing to represent and mobilize their stakeholder group for LL-activities. This will improve chances for developing self-organization in the LL. Also creativity and being open to change and multiple viewpoints are required. Lastly, LL representative board members should be able to deal with complexity, uncertainty and sometimes less organized conditions regarding the food system under study, while keeping an eye on the bigger picture. It might be hard to find all these skills and attitudes in one person, but the LL representative board as a whole should have these skills. (Enfors-Kautsky et al., 2021)

The representative board members are expected to be able and willing to assess processes at the Living Lab level and beyond, i.e. at the communal level and the wider food system level. For that reason, capacity building for systems thinking and reflective practices is key (Enfors-Kautsky et al., 2021). This receives attention in preparation for the Living Lab Launch (see Section 3.3). The capacity building exercises will be revisited throughout the project duration. System thinking exercises are relatively difficult to moderate, so the representative board should not be too large. Leaving system-centric approaches at LL-level primarily to the representative board, other stakeholders can be encouraged to system thinking related to the level at which they operate, e.g. discussing model results at farm level with farmers.

From a practical point of view, LL representative board members can be useful in mobilizing other stakeholders for expert interviews and stakeholder workshops (See section 3.3.2). This would greatly facilitate the task of LL-leaders, and ensure sufficient participants and good data quality. LL representative board members could also (self-)organize additional meetings and come up with methods that help establish a decision-making process, e.g. based on consensus or a voting system.

To ensure commitment and a durable setting for collaboration, LL representative board members should arrive at a common understanding of Living Lab principles for good practice. These principles relate for instance to the aims and values of the Living Lab, e.g. agreeing on willing to make a change, to be inclusive, and to be transparent. This is a challenging task and the start of a negotiation process in which the different stakes of stakeholder groups need to be discussed. The Living lab principles can also relate to practical engagement, e.g. to represent stakeholder group stakes, mobilize participants when necessary, or to find/propose a replacement in case continued engagement is no option anymore. Examples of good conduct are provided in Appendix C. Each LL-leader will prepare

their own principles for good practices and discuss these with LL representative board members during the preparation for the LL launch (see Section 3.3). The final selection of good practices should be shared in written form after an agreement has been reached, but there is no need to sign it.

3.3 Stakeholder selection

3.3.1 Farmer selection

Selection of farmers for surveys and workshops will be conducted with the support of multiple local organizations, such as NGOs and the chamber of agriculture. Getting the support of multiple organizations reduces the risk of only inviting a sub-sample of farmers. In case local organizations are in touch with more farmers than needed for a survey, a random selection should be made to determine who should be invited. In case necessary, such a random selection should be stratified based on predetermined criteria (e.g. farm size, age of farmer). In case an invitation is rejected, another farmer should be invited instead. A completely random sample based on a list of all farmers in the LL area is also a possibility, but might lead to high rejection rates which would slow down the research process. For farmer workshops it is recommended to invite all farmers in the LL to avoid a sense of exclusivity. For trying-out a questionnaire, local organizations may help to identify specific farmers that are known to be supportive and willing to provide constructive feedback.

3.3.2 Selecting other stakeholders

For stakeholder workshops, researchers should collaborate with the LL representative board to invite stakeholders. Together they should decide on the number of invitations per stakeholder group that is represented in the LL representative board. Additional stakeholder groups may be invited as well in case necessary, e.g. to discuss a specific policy. Ideally a general invitation will be sent to the identified stakeholders by the LL-leader and/or LL-facilitator. In case of no response, members of the LL representative board may be asked to approach invited stakeholders from their stakeholder group in person.

Members of the LL representative board may function as experts in expert interviews. However, for continued learning and exchange of new ideas, additional experts should be interviewed as well. Members of the LL representative board can help in identifying them.

3.4 Stakeholder interaction

3.4.1 Transparency

It is key to be clear about the aim of making change happen through the implementation of agroecological practices. In the communication to LL representative board members, this starts with the invitation letter (Appendix B) and can be re-affirmed when discussing good practices in the Living Labs (Section 2.3.2; Appendix C). LL moderators/facilitators should be always prepared to explain again when the occasion arises.

3.4.2 Working with human subjects: improved consent, etc.

While working with humans subjects we should be aware of ethical aspects as pointed out in the NATAE ethics document (Jalkh et al., 2023; D8.2). Two important aspects are the **informed consent** of participants and **data management.** For participants, informed consent implies the voluntary provision of information by the human subject after being informed of the project, its objectives and the destiny of the information they provide including their personal information. For the researcher, informed consent of the participant implies that data should be gathered, processed and stored according the standards that are stipulated in the informed consent form (e.g. promise of pseudonymisation[4]/anonymization; Appendix D). It also implies the proper training of the data collectors on these standards. Of course, proper data management goes beyond what is written in the informed consent form. For instance, researchers and data collectors in NATAE project will adhere to the standard of only gathering data that is useful to the project; ensure the voluntary participation of human subjects with maximal possible representativeness and inclusivity; etc. researchers and data collectors will also respect pseudonymity/anonymity and ensure the secured transfer of the gathered data.

It should be noted that for working with human subjects, authorization from national organizations or the involved research institute may be needed. In Tunisia for instance, researchers need to receive authorization from the National Personal Data Protection Agency to conduct a survey.

3.4.3 Guidelines for stakeholder activities

To ensure continued stakeholder engagement and high-quality data, some guidelines for interactions with stakeholders are needed. Workshops are preferably conducted in the morning between 9am and 1pm including a break, followed by a meal in which stakeholders can interact. Workshops may take a day in case stakeholders do a field visit, or when the morning and afternoon programs are very light (e.g. 2 times 2.5 hours). Activities ideally take place in periods of the year when there are no major events (e.g. Ramadan, national holidays) and when it is not too busy in the field (e.g. production peaks requiring a lot of labour), which differs per case study. Regarding household surveys, the maximum time is 2 hours. Per LL, LL-leaders should be aware about what stimulates farmers to participate (contributing to research, having exchanges, etc.; see e.g. Beza et al., 2017). This awareness could be used in the communication towards farmers to appeal to their interest. For stakeholder and LL representative board meetings, travel costs should be reimbursed and food and drinks should be provided. Caution is needed in reimbursing costs, as there should not be new practices introduced that may impede future research work. Participation in information sharing, experimentation, education, getting in touch with relevant stakeholders; all are part of the benefits that stakeholders could get. What is considered a benefit to a stakeholder is highly contextual and hence is likely to differ between LL. In any case, sharing appropriate benefits of the research is critical.

3.5 Moderating Living Lab dialogues and decision making

At the start of the LL process, stakeholders may not be willing to develop common goals. There might be tensions and power dynamics that inhibit a transition towards sustainability. Some actors may, for instance, intend to empower their own agenda at the expense of the participatory process (Mosse, 1994). The LL-process aims to change that through continued dialogues and trust building. Apart from trust building, capacity building and social learning are also key for successful stakeholder engagement (Harvey et al., 2013). These processes require skilful facilitation and moderation (Harvey

[4] Pseudonymisation masks data by replacing identifying information with artificial identifiers

et al., 2013). The type of facilitation and moderation of stakeholder dialogues will depend on the existing power dynamics and problem framing (Chambers et al., 2022; Figure 3). LL-leaders should be aware of this and have to adapt their way of facilitation during LL-activities according to their specific situation (Figure 3). Per LL, an assessment should be made by the LL-leader and LL-facilitator to determine how a transition towards sustainability should be moderated. A specific way of moderating may imply LL-specific adaptations of tools and methodological approaches (Harvey et al., 2013).

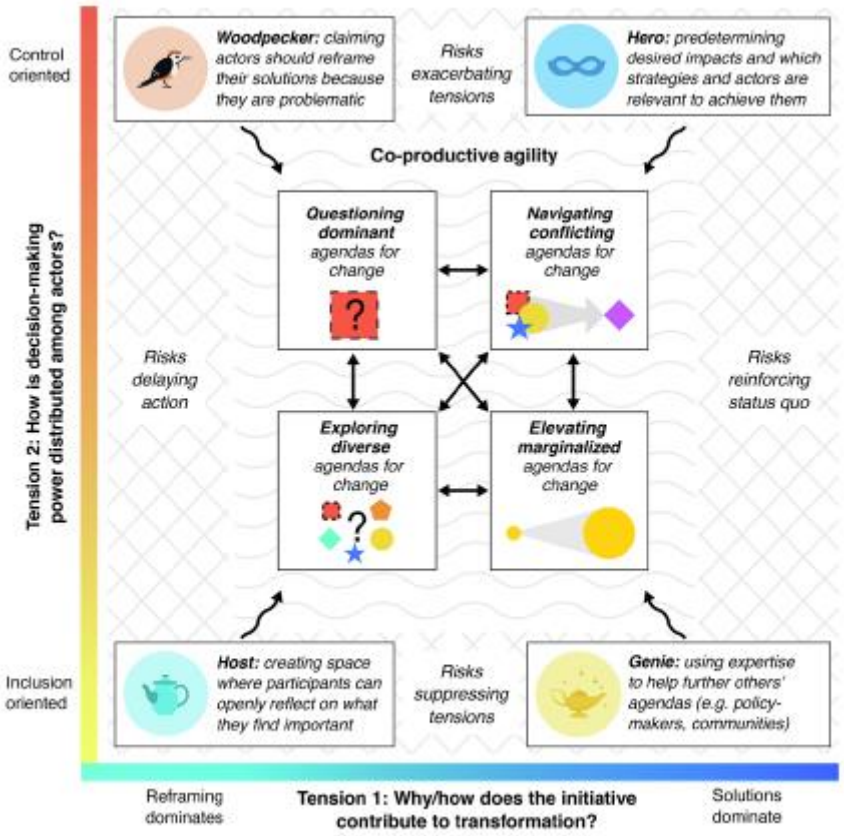


Figure 3 - Four complementary pathways towards sustainability (boxes in the centre) associated to the distribution of power and the degree into which reframing or solutions dominate. The pathways are linked to different archetypical roles for moderation. Source: Chambers et al. (2022).

Chambers et al. (2022; Figure 3) mention four different situations that require different ways of moderation. Chambers et al. (2022) link these different ways of moderation loosely to the different researcher types as put forward by (Pielke, 2007). Chambers et al. (2022) point out that, ideally, a stakeholder process is situated at the cross-section of these four situations, allowing for some tensions, but not too much, while keeping a balance between reframing the issues at stake and finding solutions. In practice, the LL-process may find itself in one of the specific situations as pointed out by Chambers et al. (2022). Depending on the situation, the LL-leader, LL-facilitator and other researchers involved, need to take up different roles as a scientist. To find out what situation(s) applies/apply to a specific LL the following questions need to be asked at the start of and throughout the project:

- Marginalized agendas: are there views that are unjustly marginalized?
- Dominant agendas: are there dominant agendas that create marginalization of other agendas?

- Conflicting agendas: are there solutions proposed by some stakeholders that create unjust situations for other stakeholders?
- Diverse agendas: does the diversity of perspectives hinder mutual understanding and collective action?

In multiple NATAE LL, farmers seem marginalized: peri-urban farmers in LL-Nouakchott were expulsed from their lands and currently hold limited land rights; peri-urban farmers in LL-Meknes are out of scope for many policy makers that prefer to focus on cereal farming; in LL-Boulemane, the focus is on female farmers, which are traditionally a vulnerable group in agrarian societies; date producing farmers in LL-Laghouat struggle for attention from policy makers that usually focus on nomadic livestock farmers that employ their strong lobbying power. Within the farmer community in a small-holder farming context, there also might be specific types of farmers whose views are marginalized (Thuijsman et al., 2022). Specific agendas for social and environmental sustainability of NGO's and governmental organizations may also be marginalized (Chambers et al., 2022) and deemed unimportant for improving agricultural production. In these situations, researchers are encouraged to pick up the role of 'science arbitrator' (Pielke, 2007), meaning that they lose their neutrality and capacities for independent observation. The researcher has to define which agendas are unjustly marginalized in this situation and create a space for humility and building trust. This can be done by emphasizing from the start on risk of blind spots when not taking into account all the stakeholder voices. In the case of farmers, specific farmer stakeholder workshop will be organized to ensure that their voice is being heard. Some of these farmer stakeholder workshops will entail key-decision moments in which AEP combinations are identified (T4.4) and tested (T4.5). Stakeholder workshops and LL representative board workshops will use the outputs of farmer workshops to reflect on the possibilities for scaling-up and scaling-out, but will have limited power to suggest alternative solutions at field and farm level.

Dominant agendas can co-occur with marginalized agendas. In the case of dominant agendas, powerful stakeholders determine the framing of the issues and control the overall narrative without reaching out to other actors that are important in bringing change. To take the case of LL-Meknes again, for instance, policy makers consider peri-urban farming as unimportant for regional and national food security. In the case of dominant agendas, underlying assumptions of those who hold power should be challenged (not the power itself, which can turn out to be quite useful for the transition process). In such situations, researchers should emphasize the legitimacy of multiple perspectives and sources of knowledge and the fact that knowledge is often fragmentized. Also discussing the capacity of the different actors to take action could help in making dominant actors getting engaged as an equal partner in a collective process. The experimentation (T4.5) could, for instance, be a showcase of the self-organizing capacity of farmers. When approaching actors with potentially dominant agendas, researchers could take up the role of 'issue advocate' (Pielke, 2007), meaning that researchers make those actors aware of a certain problem and relate this to how this actor takes position. This can be a precarious balancing act, especially when dealing with local representative decision makers whose existing discretionary power should be resected at all times (Ribot, 2004). It is discouraged to use the facilities of a dominant actor as a meeting point, as the role of host will come with a certain authority. In case of very dominant actors, LL-leaders and LL-facilitators could decide to invite them to the LL representative board only at the stage when other stakeholders have already created a safe space for exchanging views. In the ideal case, dominant actors will reframe their view on the problem and use their power in collaboration with others to bring a change. The oasis-exercise and transect walk in the context of the Living Lab launch (see section 4.2) are exercises that actively help to let actors share perspectives, discuss the system and explore underlying causes of the issues at stake.

In the situation of conflicting agendas for changes, actors seem more or less aligned regarding the problem statement, but differ in how to solve it. The challenge here is to unite the visions of different

actors into one vision that allows for collective action. In the situation of conflicting agendas, LL-leaders, LL-facilitators and other researchers involved can play the role of ‘pure scientists’ (Pielke, 2007), meaning that they discuss the desired impact of solutions and compare different solutions as objectively as possible regarding their costs and impact in social, economic and environmental domains. In these situations, the outputs from the integrated modelling chain (WP2, WP3, WP6) should get extra emphasis as they (ideally) have a degree of objectivity that surpasses those of individual stakeholders. Also, the experimentation and demonstration of AEP combinations (T4.5) supports the objective determination of costs and impacts. The visioning and back-casting exercises (T4.4) are very useful to unite stakeholders’ visions and to get to an actionable strategy where each relevant actor is identified to bring a change.

In the case of diverse agendas, stakeholders differ in what they find important and often lack the individual and collective agency to bring a change. All stakeholders may look at another stakeholder group to take action, e.g. farmers looking at the government, the government looking at the private sector, the private sector looking at what the farmers are going to do. In the case of diverse agendas, it is key to find out what the different stakeholder groups find important. To find that out, there needs to be space to openly discuss diverse perspectives. The researchers involved can take the role of ‘honest broker’ (Pielke, 2007), meaning that they make sure that all perspectives are shared. In that role, researchers try to bridge the different perspectives and facilitate decision making on what stakeholders find really important. Agreeing on a ‘code of conduct’ with LL board members makes a start with creating a safe space for interaction. The icebreaker and the photovoice method in the context of the Living lab launch are included for the purpose of creating a space for sharing perspectives. Photovoice methods may be used more often in case the agendas of stakeholders are very diverse. The identification and assessment of importance of indicators in T4.4 is also very useful for exploring the different agendas and problem framing. Regarding the lack of individual and collective agency, LL-leaders and LL-facilitators may put extra emphasis on encouraging LL representative board members to be involved in the organization of the LL, e.g. to prepare for meetings, plan field visits, reach out to food system actors at the national level etc. Also, for the experimentation and demonstration, LL-leaders and LL-facilitators and other involved researchers may steer towards self-organization of farmers, while letting go of some control in the experimentation.

In the end, all different situations as put forward by Chambers et al. (2022) may be encountered at different stages of the project. By elevating marginalized agendas and questioning dominant ones, for instance, a situation may be created where diverse agendas for change may be explored. Once these are discussed and common issues are identified, actors may have conflicting ideas on solving these issues. In this example, the involved researchers should be able to switch from ‘science arbitrator’ to ‘issue advocate’, to ‘honest broker', to ‘pure scientist’. This requires agility and feeling comfortable with the fact that objectivity is an ideal that only partly applies to research in a real-world context.

3.6 Participating as a researcher

While doing transdisciplinary research, researchers have to balance the demands from society and science with our personal needs (Sellberg et al., 2021). While engaging in the project, researchers bring in their own world views and expose themselves to real-life issues that are beyond their individual and communal capacity to solve. This may bring tensions with the demands from science (neutral observations) and society (demand for change) that can eat away their mental energy and engagement in the project. Researchers should be aware of these tensions and provide a safe space for exchanging ideas and perspectives. This will allow NATAE partners and LL-actors stay academically sound, societally responsible and mentally healthy.

3.7 Monitoring & evaluation of the LL process

Living Labs have shown their potential in urban contexts, but even there, variability and vagueness around the concept are common (Steen and van Bueren, 2017). In agricultural contexts, they are relatively new and fortunately approaches can be borrowed from urban Living Labs (McPhee et al., 2021). Still, NATAE will need to assess the performance of the Living Labs to provide recommendations that help replicate the Living Lab process in other regions.

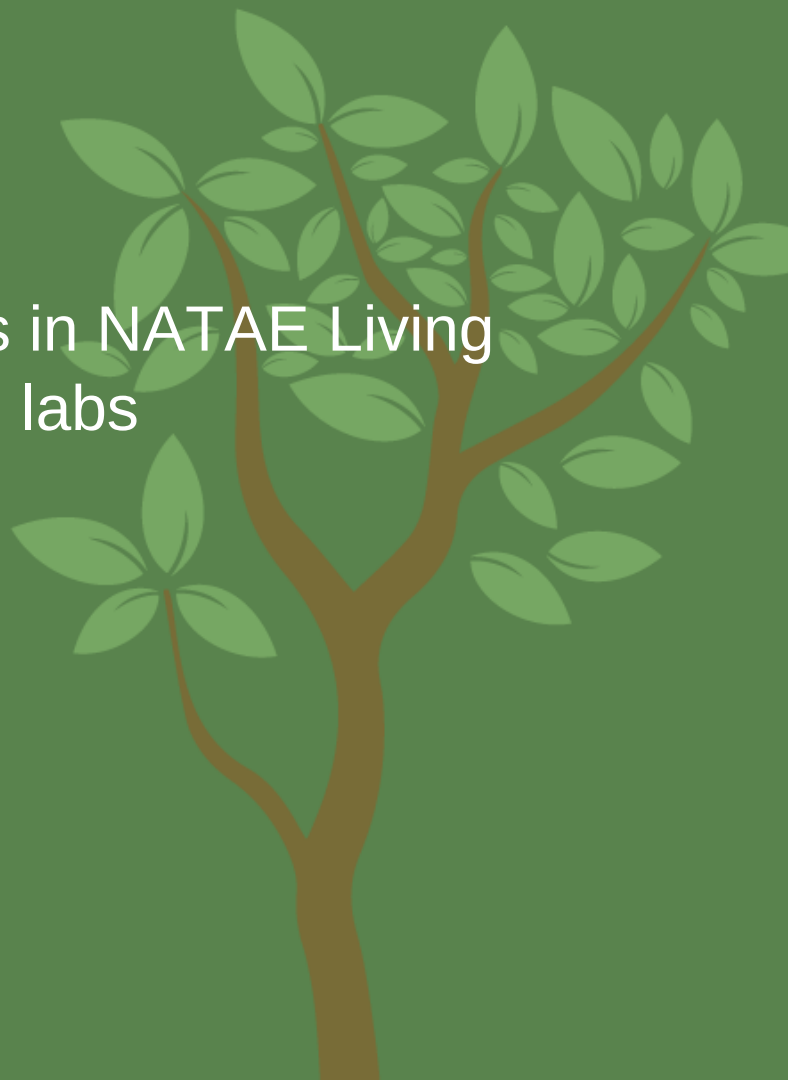
As Living Labs are context- and participant-dependent, a flexible approach is required to monitor and evaluate the performance of NATAE LL. Yet, we also need to be able to compare the different Living Labs. Common themes that may be addressed during the monitoring and evaluation relate, amongst others, to actual changes on the ground realized, general stakeholder engagement, inclusion of new actors/stakeholder groups and self-organization of the Living Lab. To accommodate for such common themes we will use and adapt existing frameworks that are designed to evaluate sustainability transition experiments (e.g. Luederitz et al., 2017; Rossing et al., 2021). Adaptations would be needed to, for instance, incorporate themes regarding the longevity of the LL after the project ends and the capacity to overcome internal differences and tensions. The monitoring and evaluation of the LL-process will align with the NATAE multi-scale and multidimensional framework (D1.1). Questionnaires will be used to capture the perceptions regarding the success of the LLs. (Slightly) different questionnaires will be developed for farmers, LL representative board members, LL-leaders and other NATAE project partners. To enlighten and validate (to a limited extent) the cross-comparison between LLs, the natural, socio-economic and institutional context of LL will be mapped regarding their commonalities and differences, e.g. regarding water constraints, soil fertility issues, inflation rates and the presence /absence of political will to endorse AEP.

Another important tool is a logbook per LL. LL need flexibility regarding methods, timing and language[5] of activities to accommodate for LL-specific needs and context. This probably leads to deviating methods, activities and possibly the general LL process. A LL-logbook will serve to make these deviations transparent. LL-leaders are required to provide a rationale that supports this deviation. Transparency and accountability will help to evaluate the factors for success (or failure) in the LL. LL-logbooks also register all particular conditions (e.g. occurrence of drought, pest, civil unrest) that may have influenced stakeholder perceptions and participation. A template for a LL-logbook will be provided by WU.

[5] The Arabic dialect that will be used in stakeholder activities and for communication in general will be different from one LL to another.

Chapter 4

Stakeholder activities in NATAE Living Labs and Replication labs



4. Stakeholder activities in NATAE Living Labs and Replication Labs

This chapter describes the stakeholder activities planned in the context of WP4 Living Labs and Replication Labs (Table 1), including the primary contact person, timing and a short summary regarding methods and expected results for each activity. Stakeholder activities are grouped per WP4 task and are presented in chronological and logical order. The logical order is determined by the emphasis that activities have regarding the action-oriented research cycle: “describe, explain, explore (& assess), and design” (DEED-cycle; Giller et al., 2008). The descriptions for the tasks to be conducted until September 2024 are more detailed than for tasks that come afterwards. From the start of the project until September 2024, the activities will lead to the following key decision-making moments in each LL:

- Employment of an LL-facilitator and LL facilitation and moderation strategy
- Social delineation of the LL:
    - Identification of relevant stakeholder groups
    - Building the LL representative board
- Geographical delineation of the LL
- Determining farm household diversity
- Identifying relevant value chains for agroecological products
- Identifying AEP combinations
- Identifying local indicators to assess performance of AEP combinations
- Identifying relevant scenarios for the evaluation of AEP combinations
- Designing and implementing experiments on AEP combinations

These key decision-making moments will allow LL-leaders to obtain the ingredients needed to construct a LL roadmap, finalized in its first version by September 2024.

While describing tasks and activities, links to other tasks and WPs are described (Figure 4). Stakeholder activities have value in themselves, but also provide input for other WPs, including the integrated modelling chain (WP2, WP3 and WP6; Figure 4). Stakeholder activities will also use modelling results and other scientific results as inputs to be discussed with stakeholders.

Obviously, a guideline cannot dictate the exact date and time of all activities (Table 1, Table 2) as this will depend on the specific LL-context. We acknowledge that the LLs are at a different stage of development and need to adapt their timeline accordingly. LL-specific timelines will, therefore, be provided on the NATAE Nextcloud.

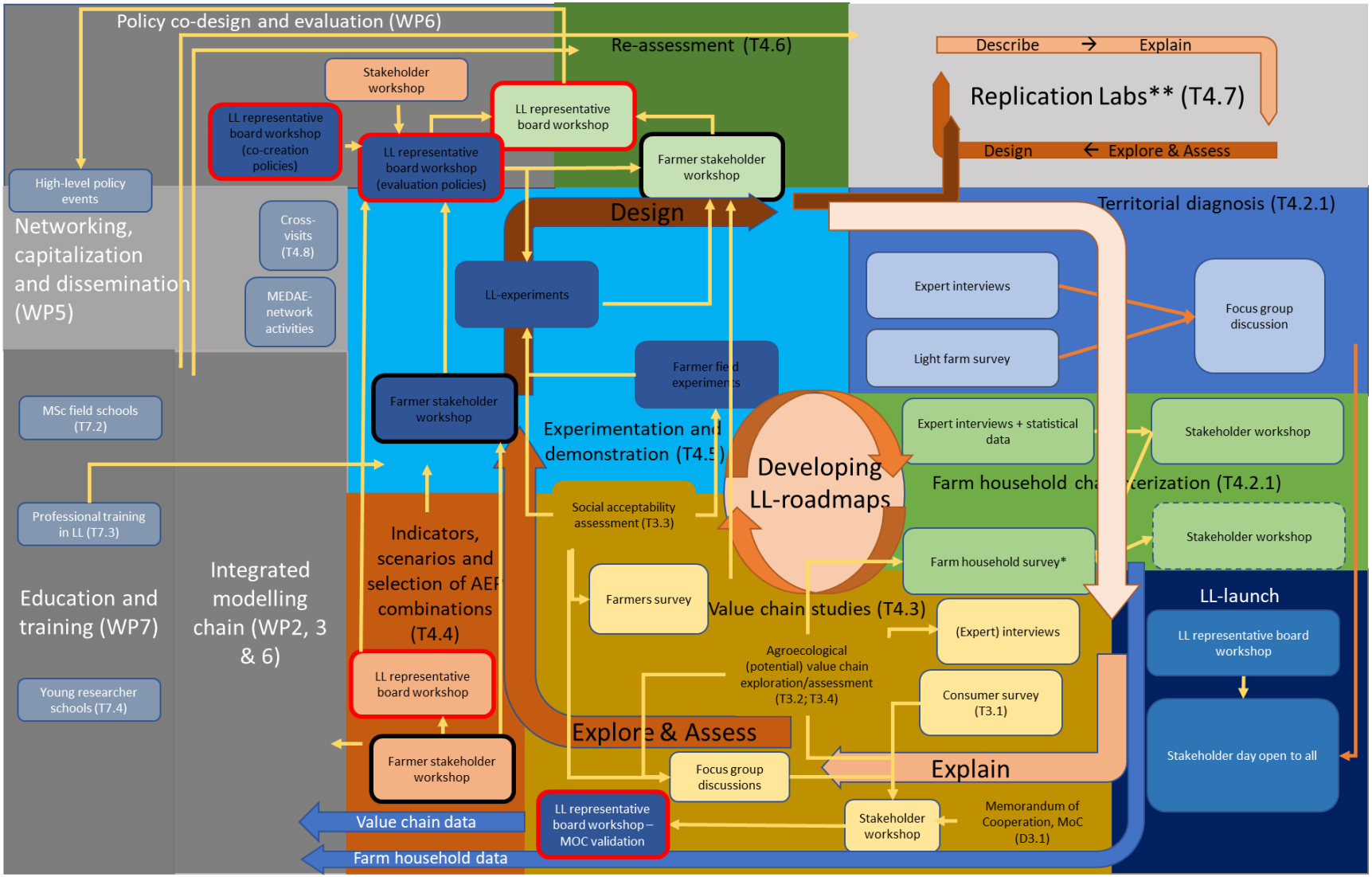


Figure 4 – NATAE stakeholder activities relating to the DEED (Describe, Explain, Explore, Design) cycle for research in development / action-oriented research (Giller et al., 2008). At the centre is the continuous joint development of LL roadmaps as researchers and LL-actors go through the DEED-cycle. Big coloured boxes with square edges are project tasks (or WP) that contain LL-stakeholder activities. Big grey boxes with square edges are project work packages with no or limited LL-stakeholder interactions. Small coloured boxes with rounded edges indicate individual-centred (within DEED-cycle) and network/system-centred (outside DEED-cycle) stakeholder activities. A dashed outline indicates that the activity is optional. Small grey boxes with rounded edges indicate activities in which mainly actors outside the LL are invited. Activities with bold outline indicate important decision-making moments at field/farm level (black) and LL-level (red). Yellow lines depict information flows. Orange lines depict validation actions. Thick blue arrows depict data flows. *The farm household survey also will cover data requirements for WP6. The research program for RL will be less heavy and benefit from the acquired knowledge and experience in the LL.**

4.1 Territorial diagnosis and farm household survey (T4.2)

4.1.1 Territorial diagnosis

Lead: ENSA

Period: Feb. ’23 – Nov ‘23

Research emphasis in the DEED-cycle: Describe

Main activities:

- Interviews with individual key stakeholders (May-July ’23)
- Focus group discussions (June-Aug ’23)

A territorial diagnosis aims at giving a comprehensive picture of the Living Labs regarding agriculture, farming systems, local governance and main and most promising value chain(s) with regards to agroecology and agroecological transition. It is the basic activity that will provide the needed information to launch the LL dynamics and its governance process.

The territorial diagnosis is mainly a qualitative and comprehensive endeavour, whose main aim is to provide the basic knowledge needed to anchor the LL dynamics and governance process. In that sense, the diagnosis consists in multiple sets of interviews, with key stakeholders at both LL and larger scales, and with LL farmers through individual or focus group exchanges. By mapping the main actors of the LL, the territorial diagnosis will prepare the co-creation of the various collective groups that will interact and foster the LL dynamics during the project: focus groups, stakeholders’ workshops, and representative board workshop initial composition will be allowed by the diagnosis results.

Expected results from the territorial diagnosis are:

1 - The basic structure of the stakeholder map is drawn: complementary **interviews with individual key stakeholders and eventually** with **focus group discussions with about 5 participants from each identified stakeholder group** (Figure 5) may be conducted to confirm and/or adapt the stakeholder map. Of general importance is the information on relationships of actors upstream and downstream of the different value chains in the LL.

2 – Main agricultural production system and their main trends for the last 10 years are identified and presented; a vision of the LL area main characteristics and recent changes (environmental, socio-economic and geographical) is delivered relying on local available data including GIS cartography, focus group(s) and interviews.

3 - Main promising agroecological practices, and combinations are identified. During the territorial diagnosis a preliminary understanding of promising agroecological practices in the Living Labs will be developed. Boughamoura et al. (2022) already provided an overview of traditional and innovative AEPs in the five different agricultural systems in North Africa; through the diagnosis, more detail will be collected at the LL level, each representing an agricultural system.

Guidelines for the territorial diagnosis were provided, taught and discussed through 2 specific NATAE training sessions, and finalized in a separate document in May and June 2023. This process has been designed so that the project partners leading this activity on the LL sites can share the same approach over this local diagnosis of agroecological transition and potentials.

Overall, it is expected that these analyses take two to three person months for an experienced engineer and three to five person months for a MSc-student

On-line trainings on ethics for data collectors / researchers were implemented on June 15 and 16, 2023, after a participative session for co-constructing tools such as the consent forms (Appendix D) and the document on basic information about the project to be shared with stakeholders (12 May 2023).

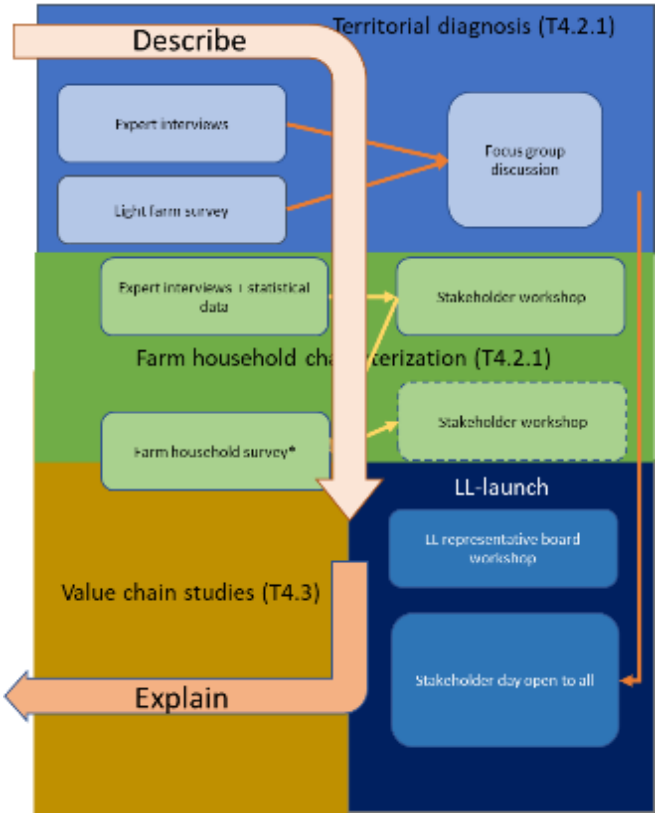


Figure 5 – Stakeholder activities for the territorial diagnosis, farm household survey and LL launch. See also Figure 4.

4.1.2 Farm household survey

Lead: WU in close collaboration with IAMM (lead integrated modelling chain) and CREAD (co-lead T2.1))

Period: Feb. ’23 – Nov ‘23

Research emphasis in the DEED-cycle: Describe

Main activities:

- Farmer stakeholder workshop for validating farm typology (Sep-Oct ’23)
- Farm household survey for up to 50 farms (Oct-Nov ’23)

This task aims to characterize the diversity of farm households in the different Living Labs. As farm households differ in structure, objectives, resources and constraints, different AEP combinations may be relevant, and their impacts on sustainability and resilience may differ. Farm diversity thus needs to be considered when assessing promising AEP combinations, and this is best done by constructing

farm household typologies. Having detailed information on the different types of farm households in the LL will facilitate the experimental design (T4.5) and is required to use the integrated modelling chain (WP2, 3 & 6). The experimentation and modelling work will provide important outputs that will be discussed in a participatory setting later on in the project (explore & assess and design phase).

In this task, the spatial delineation of the LL is further defined and described and a qualitative farm typology is developed based on the input of local actors during expert interviews. This farm typology is constructed to better understand the **functioning** of the different farm types. If regional statistical data is available, it may be used to develop an additional farm typology based on **structural aspects** (e.g. farm size, production type). In a next step, the **structural** farm typology based on regional statistical data and input from the territorial diagnosis is **validated and enriched during a (farmer) stakeholder workshop** (Figure 5), taking into consideration the lessons learnt during the construction of the **functional** farm typology. The (farmer) stakeholder workshop will be a co-learning activity where researchers and LL-actors primarily share perspectives on the existing diversity. At the same time, it is also a first step towards co-modelling and co-design, as farm types will be integrated in the experimentation and modelling later on. Farm typologies should be based on clear research objectives (Alvarez et al., 2018), which can differ somewhat between NATAE LL. For practical reasons, the number of farm types per LL should range between 3-10 (see also Alvarez et al., 2014). All steps to construct a useful farm typology will be described in a separate document.

To improve the understanding of the validated farm types, 4 to 5 farm household surveys (Figure 5) will be conducted per farm type. Having first a typology and then a survey reduces the number of surveys that need to be conducted in the LL (<50 instead of >100). The survey includes questions from the plot to the household level. It consists of a structured list of questions related to farm and household structure, crop & livestock activities, value chain activities and agroecological practices. The farmer surveys will include information that is important for value chain analyses (T3.4) and modelling policy impacts (T6.3). The surveys will take about 2 hours per farm/farmer. Some parts of the survey are mandatory, e.g. for modelling purposes or to get a basic awareness about the farm context. Some parts of the survey will be optional and it will be up to the LL-leader to decide which of these optional parts will be included, depending on most pressing local challenges and corresponding research questions. LL-leaders will also have the flexibility to organize the work in two rounds, i.e. re-visit the farmer in case it is not possible to take too much time at once.

The final typology methodology and survey design will be provided in separate documents in June 2023. Surveys will be tested in LL-Luxor and possibly in LL-Boulemane in spring/summer 2023, revised if required and implemented in the other LLs in autumn 2023. The activities in LL-Luxor will serve as a trial and example for other LLs. LL-leaders will adapt the survey to accommodate to the local context, e.g. adapt units, crops mentioned. An online training for implementing the activities (workshop, survey) is foreseen in September 2023. The persons that do the actual surveys will receive additional training in September 2023. Further support by IAMM and WU on the ground is foreseen for some LLs. For the analysis, a data cleaning protocol will be provided. Preparation and analysis of the surveys takes about 1-2 person months from LL-leaders.

4.2 Launching the Living Labs in September

Lead: WU

Period: Sep-Oct ’23 for LL, for RL in the course of 2024

Research emphasis in the DEED-cycle: Describe, Explain

Main stakeholder activities:

- LL representative board workshop (Sep ’23)
- Living Lab Launch (Sep-Oct ’23)

A separate event is foreseen for the launch in each Living Lab. This is an event for all the NATAE Living Lab actors (Figure 5).

Before the launch of the LL, the representative board members will meet during two half days (on separate days or on the same day), to prepare the launch (Figure 5). This will be the first time they meet in the context of the project.

Preparation by LL-leaders:

- Living Lab leaders should prepare a preliminary “Code of good conduct for Living labs” that fits the local culture and objectives of the Living Lab. Appendix C provides examples of good conduct.
- Based on their knowledge and experience, LL-leaders and LL-facilitators should evaluate what type of moderation may be needed in their LL taking into account the local stakeholder dynamics and problem framing (Section 3.5; Chambers et al., 2022; Figure 3).

Program LL representative board meeting:

- First, an introduction to NATAE will be provided.
- Ice-breaking activity where LL representative board members have to find 5-10 things that they have in common. The ice-breaking activity aims to reduce the potential influence of hierarchy among LL representative board members. This will create space for exchange. (15 minutes; Appendix E; having an alternative ice-breaking activity is possible).
- LL representative board members present themselves by using a photo that represents their perspective on the local food system with its opportunities and constraints. Ideally, the photo should be taken by the person. Alternatively, they could use any other photo, drawing or even a small object. Appendix F provides instructions for this exercise. This exercise aims to support LL representative board members to express their perspectives without the possibility to be interrupted by other board members. (30 minutes)
- LL representative board members will be reminded about their expected role: developing a collective vision for the LL, taking a food system perspective while representing their stakeholder group. (15 minutes)
- After that LL representative board members will be presented with the general “code of good conduct” in the Living Lab (see also the needed preparation done by LL-leaders; Appendix C). The “code of good conduct“ should be evaluated with LL-representative members, and where necessary adapted. There is no need to sign anything, but it would be good if LL representative board members could somehow symbolize their agreement, e.g. with a handshake. Agreeing on a code of good conduct will contribute to creating a space for exchange and co-learning. The final version of the code of good conduct should be shared with the LL representative board members in written form in the local language and with the consortium in English. (30 minutes)
- The next activity is a systems thinking exercise based on the oasis-model (see Appendix G for instructions). This exercise aims at explaining the dynamics in the LL and underlying mechanisms causing them. It encourages reflexivity and helps to get to a common framing of the issues in the LL. (2 x 60 minutes; not in the same part of the day)
- Finally, LL representative board members should provide their input on the agenda for the launch of the living lab and plan a transect walk (See program for the launch below; see Appendix H for instructions; 90 minutes).
- Provide drinks and snacks during the meeting and a lunch afterwards during which LL representative board members can meet informally.

The launch of the Living Lab should be a festive event, open to all interested, celebrating the network, be informative about the NATAE project and the planned activities. It also provides an opportunity for actors other than farmers to visit the field. Based on stakeholder input, preliminary AEP combinations may be identified for the experimentation in T4.5. Also a preliminary choice for certain value chains may be made for the value chain analyses in WP3.

The preliminary agenda:

- Welcome with drinks (coffee/tea)
- Introduction to NATAE, agroecology, food systems and the Living Lab (30 minutes)
- Presentation of the LL representative board members and their expectations of the LL process, e.g. their vision on the agroecological transition, what they expect to bring, expect to learn, and how they expect to do this. (20 minutes)
- Transect walk allowing for informal talks among stakeholders (Appendix H). The transect walk will put the participating farmers in the position of host, which is expected to come with some sort of natural authority. This is very important considering that the perspectives of farmers run the risk of being easily marginalized (see also section 3.5) (1.5 hour)
- Coffee/tea-break
- Discussion on what has been learnt during the transect walk regarding agroecological practices relevant for the LL, including their barriers and levers. As this exercise is based on recent observations in the field, it provides an opportunity for stakeholders to notice what other stakeholders have seen. The different observations will probably point at the fragmentation of knowledge and the existence of blind spots. This can contribute to the awareness of stakeholders that they need to collaborate with others to solve issues in the LL, e.g. that they need to co-learn, co-design and co-produce. (30 minutes; using post-it; instructions are provided in Appendix H)
- LL-leaders/facilitators may use the outcome of the previous discussion to gauge the enthusiasm for starting the experimentation on certain AEP combinations (T4.5) already.
- Presentation on preliminary results from the territorial diagnosis with the possibility to confirm the value chains that should be studied in the context of WP3 (20 min)
- More drinks and some snacks

In the evaluation phase, LL-leaders will concisely report on the systems thinking oasis-model exercise and the transect walk (see Appendix G and H). Based on the first LL representative board meeting and the Living Lab launch, LL-leaders and LL-facilitators will also evaluate and document the way in which they will moderate future stakeholder activities (see section 3.5). In an online meeting before the first Living Lab launch, WU will provide more information and instructions to LL-leaders on how to do this.

Replication Labs are encouraged to build a representative board and launch the Replication Lab in the course of 2024.

4.3 Stakeholder activities in the context of WP3 (T4.3)

Lead: UTH (WP3-leader)

Period: Aug'23 – Nov '25

Research emphasis in the DEED-cycle: Describe, Explain and Explore & assess

Main activities:

- Expert interviews (T3.1; Oct-Nov ’24; UTH)
- Consumer survey (T3.1; Oct-Nov ’24; UTH)
- Semi-directed interviews with value chain actors (T3.2; Sep ’23 – Feb ’24; IAMM)
- Semi-directed interviews targeting vulnerable populations (T3.2; Sep ’23 – Feb ’24; IAMM)
- Focus group discussions (T3.2; Sep ’23 – Feb ’24; IAMM)
- Survey (T3.2; Sep ’23 – Feb ’24; IAMM)
- Social acceptability survey (T3.3; timing: tbd, ideally during co-design of AEP experiments of T4.5)
- Interviews with value chain stakeholders (T3.4; May ’24; IAMM)

In this task, the stakeholder activities in T3.1 to T3.4 will be implemented (Figure 6). The overall objective of these stakeholder activities is to gather data and build connections with stakeholders to evaluate and foster the integration of agroecological products in the food system in which each LL participates or potentially could participate. At the start of the project, most stakeholder activities will be individual centric, focussing on thoughts, feelings and experiences that can explain stakeholder perspectives, needs and decision making. Later on in the project, more network-oriented stakeholder activities will take place in which co-learning and co-design can take place. For the aim of assessing the contribution of agroecological models to strengthen territorial food systems, the value chain analyses consider the interactions between value chain levels from producer to consumer. To this end, value chain stakeholder perceptions will be solicited to understand and analyse barriers and keys drivers related to the participation of producers in value chains and the structuring of markets for agroecologically produced food. For each stakeholder activity separate guiding documents and (online) training activities will be provided.

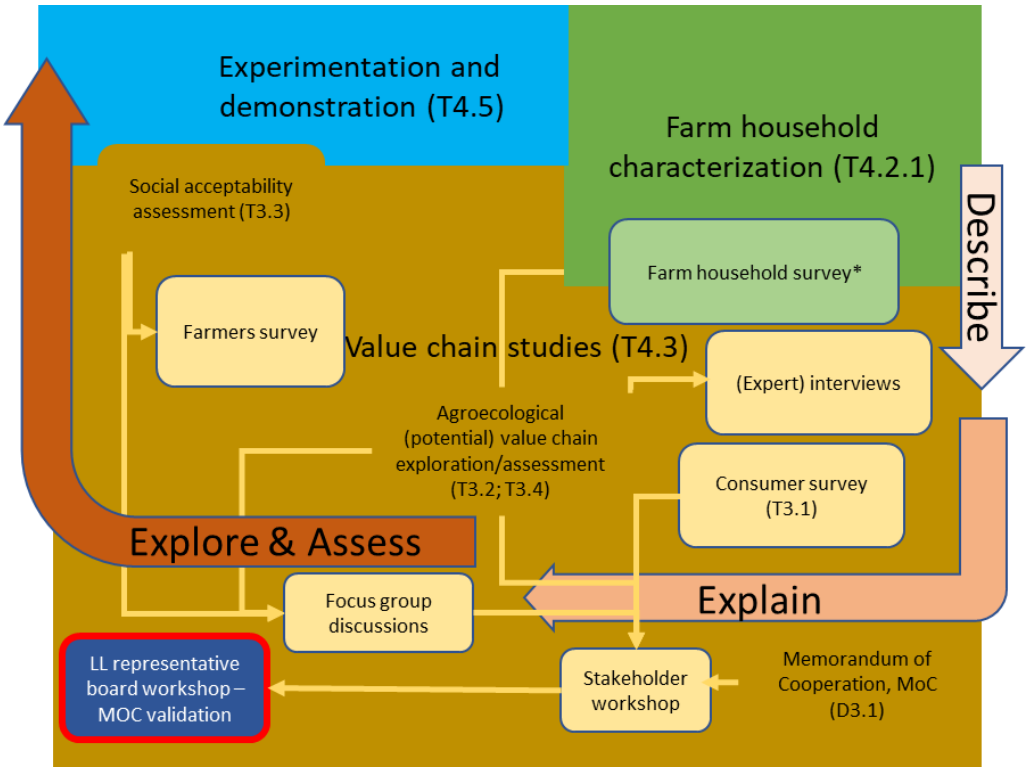


Figure 6 – Stakeholder actvities in the context of value chain studies (T4.3). See also Figure 4.

To assess local consumer demands (T3.1; lead: UTH), **expert interviews** will be held in the LL, taking about 30 min per interview. Resulting information will be confirmed by a **consumer questionnaire**

among 500 respondents within the country of the LL, taking 10-15 minutes each. Overall, 1 person month per LL is expected for preparing, conducting and reporting on this activity.

For this survey it is key that **interviewers are trained and also supported during the first day(s) of implementation**. In particular, research aims should be clear to interviewers. The relational aspect in conducting interviews needs to be addressed as well in the training of interviewers. To provide training, support and to test the consumer survey (T3.1), Consortium partner UTH is aiming to travel to the LL-areas in October and November 2023. Apart from training and support, their 2-3 days visit will, where possible, also serve to visit the LL area.

The methodology regarding T3.2 'Evaluating and strengthening the integration of AE value chains' will be led by IAMM. A value chain is defined as the set of activities that are involved to bring a product from its conception through the different phases of production to its final disposal and delivery to end consumers (Kaplinsky and Morris, 2000). In this task, a conceptual framework will be built for a value chain assessment using a combination of existing approaches (e.g. Bolwig et al., 2010; Hardesty et al., 2014; Hearn et al., 2007). The framework will be adapted to the specificities of the local, multi-dimensional and diverse context for every country where selected AE value chains will be studied (Kremen et al., 2012).
The task will provide descriptions of the overall value chain structure, organisation and governance (e.g. regarding horizontal and vertical arrangements), market access strategies for locally produced agroecological products, and the overall performance of the value chain based on quantitative and qualitative indicators. This task contains multiple stakeholder activities that still need to be developed (semi-directed interviews with value chain actors, semi-directed interviews targeting vulnerable populations -women and youth - , stakeholder focus groups, and a survey). For this task, students may be involved in field work alongside more senior researchers and data collectors. The stakeholder activities will take place between August '23 and February '24.

The methodology regarding social acceptability (T3.3) is likely to be integrated in the stakeholder activities for T4.5 'Experimentation and demonstration' between October '23 and November '25. A survey at LL territorial level will be the main research tool.

For the value chain impact assessment (T3.4; lead: UTH), the multi-dimensional impacts of promising agroecological value chains (as identified in T3.2) will be compared with conventional value chains using a coherent set of indicators and the DAHBSIM Value-Chain model (WP2). The **farm household surveys** of T2.1/T4.2 will be used to obtain data on farm structure and data on input/output of cultivations for this model. T3.4 will also include interviews with value chain actors to obtain quantitative information on a set of selected indicators and expert estimates on values for indicators when reliable primary data cannot be collected. These interviews are planned for the period from January till May 2024. Data collection will be ensured by trained resources in each LL, an option being to involve MSc-students to prepare, conduct and analyse these interviews as part of their thesis.

Dependent on the needs and capacities of LL-leaders, additional methods may be implemented regarding the impact assessment (and consumer demand studies). It would, from a research point of view, for instance, be very interesting to have a **repetitive survey** that allows to assess developments over time.

In the context of T3.1, a Memorandum of Cooperation (MoC) between value chain actors will be created regarding the (potentially) important value chains in which agroecological products will be valorized. Such a MoC can be seen as a start for developing a Participatory System of Guarantee (PSG) between local producers and local/national consumers. During the LL-launch, a preliminary selection may be made regarding (potentially) important value chains for agroecological products. An additional stakeholder workshop integrating research outputs from T3.1-T3.4 will be needed to re-address the selection of value chains (Figure 6). In a subsequent LL representative board workshop, the final content of the MoC will be determined (Figure 6). Obviously, more stakeholder meetings and

professional guidance will be necessary to develop a PSG. NATAE will provide a base, while self-organized LL could take over the process towards a PSG, once the project has ended.

Detailed guidelines for all methodologies will be provided a few months before the implementation of the stakeholder activities.

4.4 Choosing scenarios, indicators and co-designing AEP combinations (T4.4)

Main contact: WU

Period: Aug ’23 – March ‘24

Research phase in DEED-cycle: Explore & assess, Design

Main activities:

- Farmer stakeholder workshops (Dec ’23 – Jan ’24)
- LL representative board workshops (Dec ’23 – Jan ’24)

In this task, stakeholders will identify AEP combinations and evaluated their perceived performance under different scenarios using locally relevant indicators. Scenarios in this task are climatic, socio-economic and institutional external driving forces combined with situations in which AEP combinations are implemented or not. These scenarios will provide insight on the perceived performance of AEP-combinations under different conditions compared to current practices. Local indicators are needed to perform an evaluation on the performance of AEP combinations on the LL that is meaningful to researchers and LL actors. The locally identified indicators will cover the social, economic and environmental domain and will be linked by researchers to the multi-dimensional NATAE research framework. To elicit stakeholders’ input on local indicators, LL-leaders and LL-facilitators may use (preliminary) results from previous activities during the territorial diagnosis, household survey and value chain analyses. Stakeholder will be asked how they perceive the importance of all locally defined indicators. This may reveal differences between stakeholders that need to be discussed to understand the problem framing of different actors (see also section 3.5).

As the workload is high in this task, two workshops will be organized: a farmer workshop, followed by a LL representative board workshop (Figure 7). In the farmer workshop, the emphasis will be on identifying locally relevant indicators and AEP combinations at farm level. The output of the farmer stakeholder workshop will serve as input for the LL representative board workshop, i.e. in the latter, participants will work with the AEP combinations selected at farm level and identify complementary practices at LL-level that can support those practices. This way, farmers’ input into the co-design process is guaranteed. The LL representative board workshop will address indicators and the identified AEP combinations at LL-level and evaluate their potential social, economic and environmental performance given different scenarios. Working with locally adapted indicators that cover the social, economic and environmental domain will provide opportunities for co-learning, e.g. regarding trade-offs between economic and environmental indicators. Farmer and LL-representative workshop outputs (AEP combinations, local indicators) will be used for T4.5 “Experimentation and demonstration” and the integrated modelling chain (WP2; including also the results on scenarios). These workshops are therefore considered as key moments for decision making and co-design.

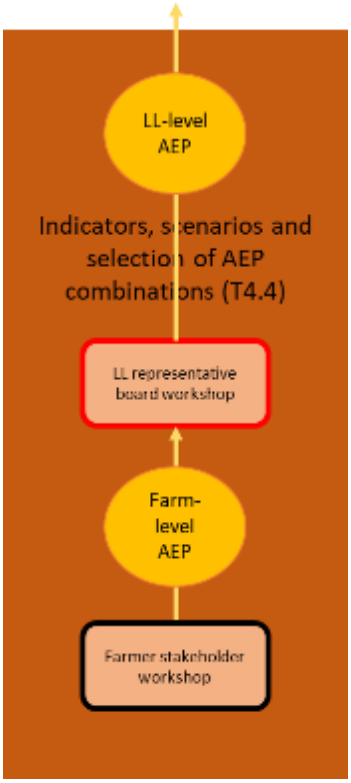


Figure 7 – Stakeholder activities in the context of T4.4. Yellow ovals indicate the decisions made regarding the selection of AEP. See also Figure 4.

Farmer stakeholder workshops (Dec ’23- Jan ’24)

- Participation: primarily farmers
- Duration: at least 2 x 2.5 hours, but preferably 2 days.
- Aim: solicit stakeholder agendas and perspectives regarding problem framing and the identification of solutions (see also Figure 3)
- Identification of farm level indicators for the social, economic and environmental domain as suggested by farmers.
- Problem framing using the identified farm level indicators.
- Validate the local diagnoses on current AEP adoption, barriers and opportunities (from T4.2 and T4.3)
- Co-designing AEP combinations per farm type that address the mentioned problems.
- Evaluating perceived impact of those farm type-specific AEP combinations on the identified indicators.
- Identifying barriers and opportunities for the co-designed AEP combinations. (To provide a bridge with the stakeholder workshops in T6.2.2 in spring 2024)
- Guidelines and reporting protocols will be provided in Autumn 2023.
- Preparation, conducting workshops and reporting will take about 1 person month from LL-leaders and LL-facilitators

At the end of the farmer stakeholder workshop, participants will be asked about ideas, willingness and conditions for engagement to run their own experimental design (In preparation for T4.5).

LL representative board workshops (Dec ’23- Jan ’24)

- Participation: LL representative board members
- Duration: 2 x 2.5 hours
- Aim: solicit different stakeholder agendas and perspectives regarding problem framing and the identification of solutions (see also Figure 3)

- Validate the local diagnoses on current AEP adoption, barriers and opportunities (from T4.2, T4.3 and the farmer workshop of T4.4)
- Visioning and back-casting exercise to discuss possible futures and ways to get there (e.g. Paas et al., 2021c; Ronner et al., 2023).
- Looking at constraining and enabling factors for innovative AEP, inspired by Agricultural Innovation Systems literature (e.g. Schut et al., 2015)
- Pre-selection of scenarios, indicators and AEP in a FoPIA-approach (König et al., 2013; Morris et al., 2011; Paas et al., 2021b)
    - Scenarios include socio-economic, institutional and/or environmental changes that have an impact on the agroecological transition. Combinations of these changes will be translated in three scenarios: a **desired scenario** with only favourable changes, a **continued status quo scenario** with changes that keep the current system in place, and a **marginalisation scenario** with only disfavourable changes.
    - Importance assessment of system indicators
    - Performance assessment of system indicators under different scenarios with and without AEP combinations.
- The workshops will be embedded in the wider transition literature (e.g. de Haan and Rotmans, 2011; Geels, 2011) including its multi-level approach (see e.g. Rossing et al., 2021).
- Guidelines and reporting protocols will be provided in Autumn 2023.
- Preparation, conducting workshops and reporting will take about 1 person month from LL-leaders.

4.5 AEP innovation experimentation and demonstration, in partnership with local actors (T4.5)

Lead: ICARDA

Period: Nov ’23 – May ’26

Research phase in DEED-cycle: Explore & assess, Design

Main activities:

- Farmer stakeholder workshop 1 (spring 2024)
- Farmer-led experimentation season 1 (timing: tbd, will differ per LL)
- LL representative board workshop 1 (spring 2024)
- LL representative board led experimentation (timing: tbd, will differ per LL)
- Farmer stakeholder workshop 2 (timing: tbd, will differ per LL)
- Farmer-led experimentation season 2 (timing: tbd, will differ per LL)

The general notion in this task is to co-design experiments at farm and LL-level with local actors, in particular farmers. However, to get started quickly, ICARDA will approach LL-Leaders even before November ’23 to make sure that existing practices and experiments can be visited and no experimental season will be lost. The territorial diagnosis, household survey and living lab launch may be used to select the first AEP combinations for experimentation. In most LL, there is already ample experience that can guide the decision for a first trial with AEP combinations under experimental conditions or even field conditions. Also, LL representative board members could be consulted on an individual basis. An additional advantage of starting soon is that the experiments can become something very tangible early on in the project. This can help to explain the concept of agroecology and the aims of the NATAE project.

Based on the existing experiments and identified AEP combinations (T4.4), ICARDA will facilitate a farmer stakeholder workshop to design a farmer-led experiment (Figure 8). Farmer-led experiments in combination with co-learning activities can enhance the uptake of agricultural innovations (see e.g. Marinus et al., 2021). Farmers will be informed about the requirements and trained for running and monitoring an experiment. Ideally, each identified practice is replicated a few times per farm and on different farms. Farmer field experiments including a combination of practices are also an option. Farmers can indicate their willingness to participate in the experiment during the farmer stakeholder workshop. It is fine to focus on the farmers that are willing to participate, as other farmers may follow later after seeing a successful experiment. After the workshop, researchers and participating farmers are encouraged to engage other farmers as well. The workshop on co-designing the experiment should be a direct follow-up on the farmer workshop on co-designing AEP combinations in Dec '23 – Jan '24. Ideally, the same farmers participate in those two workshops. Dependent on the growing season, the experiments will start soon after the workshops.

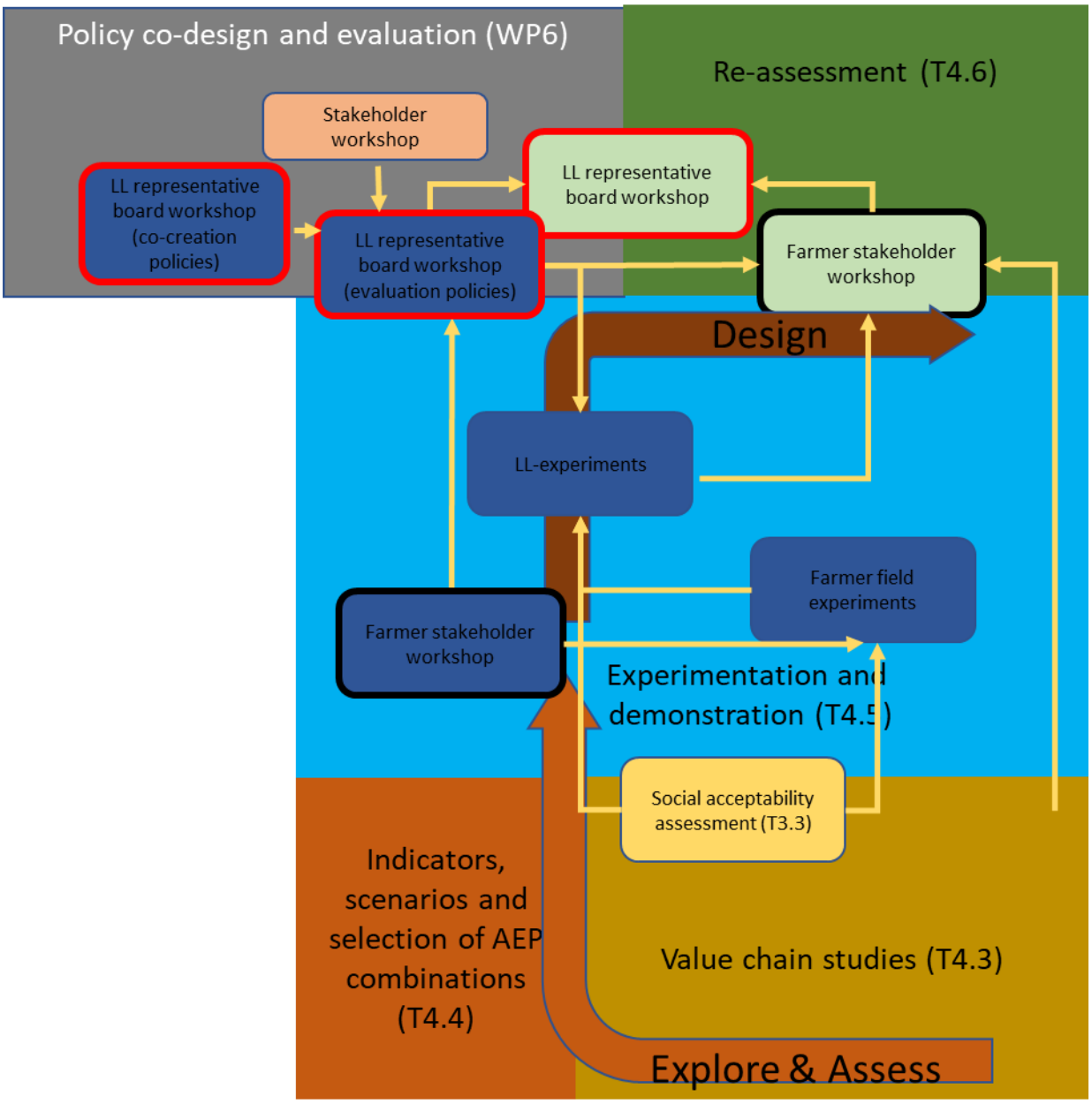


Figure 8 – Stakeholder activities in the context of T4.5, T4.6 and WP6. See also Figure 4.

The discussions that lead to the farmer-led experiment will probably take place in Spring 2024. There is no fixed methodology to be followed for this discussion, as this will depend on the LL conditions. ICARDA, LL-leaders and probably the -LL representative board will work closely together to determine the right discussion format in each LL. The only consistent elements across LL that are foreseen are extensive discussions in a workshop setting where every farmer and other stakeholder voice will be heard and listened to. The actual widescale experimentation of AEP combinations **by farmers will be conducted in the context of farmer field schools** or resembling approaches that ensure **experimentation** under real field/farm conditions. 2-3 AEP combinations will be tested per LL to ensure the 15 tested AEP combinations as promised in the research proposal. Ideally, at least one AEP combination per LL will go beyond the field and farm level, e.g. organizing a seed exchange event or working towards a participatory system of guarantee.

ICARDA will provide (LL-specific) methodological guidelines for helping farmers designing and monitoring their own experiments. This will likely be done in the context of providing professional training in each LL (T7.3). ICARDA will further bring in its extensive experience with the experimentation and implementation of new crop varieties (cereals, some perennial crops, not so much regarding vegetable crops) and management techniques related to soil, water conservation and integrated pest management. ICARDA usually works together with national research institutes in setting up farmer field schools. ICARDA will make sure that staff in local offices throughout North Africa will get in touch with national research institutes and LL-leaders to get informed about the local situation and to plan a visit before activities start.

After the experiments have started, researcher **field visits** will be planned throughout the experimentation period. Field visits are a good way to stay aligned with farmers. During the field visits, possible adaptations of the experiment will be discussed. In a more formal field visit/stakeholder workshop, stakeholder approved adaptations will be identified to be implemented in the following growing season. The whole process with field visits and discussions will be repeated in that following growing season. During the experimentation phase, researchers, e.g. PhD-students and Msc-students, will evaluate the experiment with farmers several times and gather in-depth detail on the environmental, social and economic impacts of the tested agroecological practices. For instance, yields may be measured systematically by researchers in addition to the registration of farmer-reported yields. LL-partners can indicate their interest in hosting PhD-students. Time expected from LL-partners is about 2 person months for preparing and reporting on workshops and field visits and at least 2 person months for guiding farmers in setting up, running and monitoring their experiment.

Detailed guidelines for running workshops and writing reports will be provided in a later update of these guidelines.

4.6 Participatory re-assessment with stakeholders in the LL (T4.6)

Lead: WU

Period: Sep ’25 – Jan ‘26

Research phase in DEED-cycle: Design

Main stakeholder activities:

- Farmer stakeholder workshop (Sep-Oct ’25)
- LL representative board workshop (Oct-Nov ’25)

Re-assessment by farmers is ideally done in the context of the experimentation (T4.5; Figure 8), using similar evaluation techniques as proposed in T4.4 to be able to observe changes in stakeholder

perspectives. Further discussions between WU, ICARDA, LL-Leaders and other research partners involved (e.g. from WP2, WP3 and WP6) are thus needed to develop the re-assessment approach.

For the re-assessment with LL representative board members, LL-leaders and LL-facilitators will start with presenting the workshop outcomes from T4.4, preliminary experiment results (T4.5) and the results from the integrated modelling chain (WP2,3&6; Figure 8). After that, a similar assessment as in T4.4 is foreseen to evaluate how stakeholder perceptions on the impact of AEP combinations have changed. This also relates to the T3.3. on social acceptability; synergies between T4.6 and T3.3 should be sought to avoid overlapping activities. The re-assessment should allow stakeholders to suggest adaptations to the AEP combinations, and to identify constraining and enabling conditions for these combinations. LL representative board workshops will take place in the period from Oct ’25 - Nov ’25. 1-2 person months for preparing, conducting and reporting are expected from LL-leaders. Possibilities to merge this workshop with the second series of policy co-design workshops (T6.2.2) should be studied.

Besides a structured workshop, additional options for (re-)assessment could also be considered, specifically regarding the experimentation. For instance, in-depth interviews with farmers who conducted experiments could help compare their perception with measured results, and feed in T4.5 (with the potential to conduct MSc- and PhD-thesis studies).

The methodology will be further developed by WU and multiple project partners in 2025.

4.7 Testing the rapid evaluation protocol in replication sites (T4.7)

Lead: IAMM

Period: May ’25 – Dec ‘26

Research phase in DEED-cycle: Describe, Explain, Explore & asses, Design

Main stakeholder activities:

- Some activities related to the territorial diagnosis (in the course of 2024)
- LL representative board workshop in preparation for launch (timing: in the course of 2024)
- Replication Lab launch (timing: in the course of 2024)
- Farmer stakeholder workshop (timing: tbd)
- Light surveys (timing: tbd)

In this phase of the project, NATAE partners have identified AEP (combinations) that might be interesting for the replication labs, based on LL experience and exchanges through MEDAE network. These should be evaluated with stakeholders in the RL in a relatively short amount of time. Probable stakeholder activities are (farmer) stakeholder workshops and light surveys linked to T4.2. Furthermore, modelling may take place for several of the RL. Also, a launch should be organized (Figure 9). The methodology for RL will be further developed by WU in autumn 2023 (T2.4).

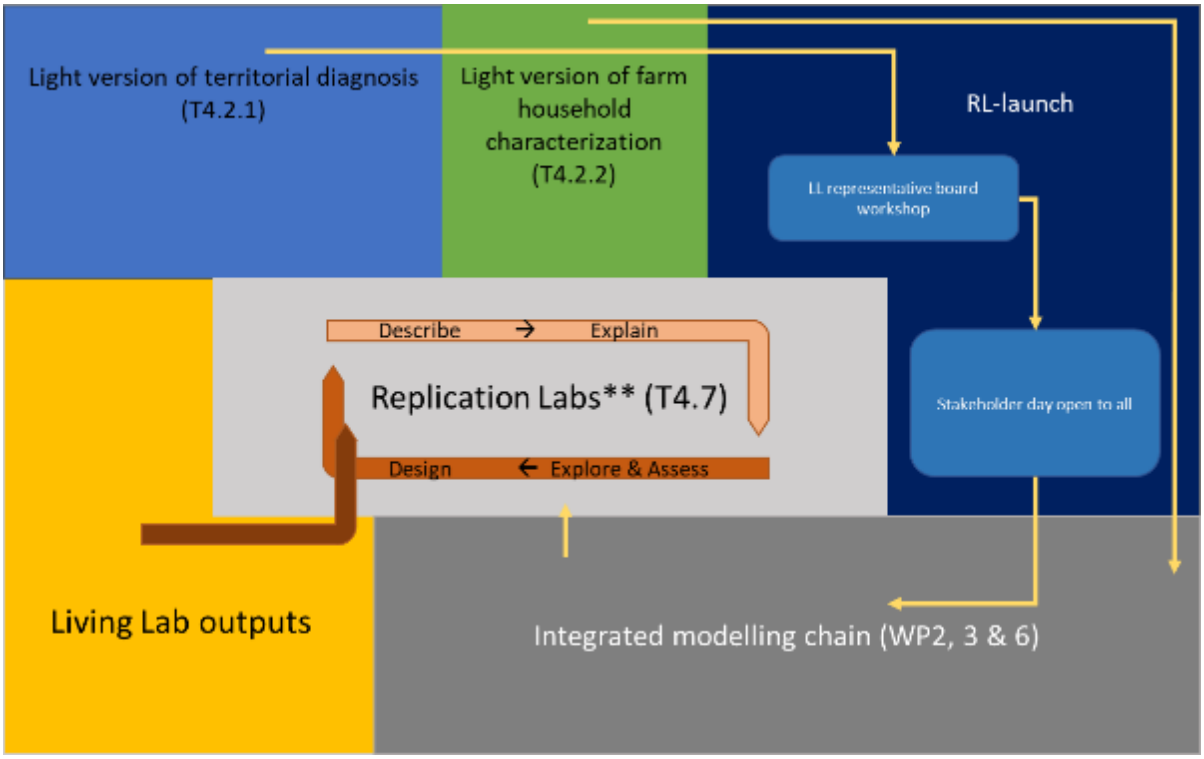


Figure 9 – Envisioned methodology for NATAE Replication Labs. See also Figure 4.

In preparation for this task, Replication Labs are encouraged to already start creating the stakeholder representative board from January 2024 onwards. Also, certain activities may already be implemented, for instance some elements of the territorial diagnosis and the household survey. This will pave the way for a smooth implementation of the rapid evaluation protocol. More information will be provided towards the end of 2023.

4.8 Cross-visits at living labs and replication labs level (T4.8)

Lead: CARI

Period: 2024-2025

Research phase: explore and design

Main stakeholder activities: 4-5 cross-visits (Jun ’24 – Dec ’25)

Objectives

The general goal of the **cross-visits** is to exchange knowledge on agroecological practices and Living Lab functioning among LL stakeholders. Even for LLs with different agroecological settings (e.g. oasis versus cereal plains), sharing of practices on some common challenges can be really insightful (e.g. soil fertility or water management but also product valorization and commercialization) as well as at the level of governance (e.g. LL dynamics and functioning). The cross-visit will mainly focus on field visits to discuss the agroecological specificities of the LL, and the challenges and solutions that may be interesting to share. **Workshops** can also be organized. The cross-visits will also be an occasion to gather information in the form of **images**, capsule **videos** and participant reflections. These will be incorporated in a **travel book** that will allow to disseminate NATAE project results to a broad audience. Finally, the cross-visits aim to create durable engagement and a sense of ownership at the level of the overarching network of NATAE Living Labs in North Africa.

Calendar and tasks

Four to five cross-visits will be planned at regular intervals in the years 2024 and 2025. Each cross-visits will take several days. Initially, two persons from each LL will be selected to participate in all the cross-visits, so a long-term commitment is key. One of the participants of each LL will be selected from the stakeholder groups that actually implement agroecological practices, i.e. the practitioners. The other participant will represent stakeholder groups (research or civil society) related to the governance of the agroecological system, i.e. actors that influence the enabling environment for the implementation of agroecological practices. Each participant will have a defined mission to document reflections that will be incorporated in the travel book. At the end of the cross-visits, participants will report back on their observations and learnings on their LL and discuss the spin-offs for their LL. Other cross-visit participants are the hosting LL committee, a photographer and the task leader. After having gained experience in organizing the cross-visits (e.g. with regard to the time and funding it takes), more participants may be included (e.g. actors from replication labs). To stay updated, cross-visits will be announced to the whole consortium.

Organizing the cross-visit (field visits, workshops, transport and accommodation) is expected to require one to two person months per organizing LL-partner. Other than that, no time is expected from LL-research partners in this task. Direct links with other Work Packages are at the moment not foreseen and will need further reflection in case necessary. More detailed instructions on organizing cross-visits will be made available in January 2024 in a separate document.

Chapter 5

Stakeholder and outreach activities for WP5, WP6 & WP7

5. Living Lab outreach beyond its boundaries

As mentioned before, a Living Lab approach alone will not lead to transformational change; linkages with actors outside the Living lab boundaries need to be established (Schäpke et al., 2018). In this Chapter the LL process is linked to activities regarding networking, capitalization and dissemination (WP5), policy co-design (WP6), and education & training (WP7) (Figure 4).

5.1 Networking, capitalization and dissemination (WP5)

5.1.1 Transferability workshops (T5.1.4)

Lead: SPI

This task will focus on sharing the best practices of NATAE and transferring knowledge to other EU and Africa regions. To ensure a thorough reflection on the user perspective, LL and RL leaders will be involved in an internal meeting to discuss opportunities for transferring the NATAE methodologies, frameworks and lessons in transition strategies and transformative changes. The transferability workshop will be conducted during the NATAE final event. Selected representatives of target regions will be invited to share their experiences, successes and failures. Transferability of main project outcomes to other African regions will be discussed. This workshop will set the basis for the definition of a long-term sustainability strategy. (NATAE project document).

5.1.2 MEDAE, a multi-actor Mediterranean community of knowledge on agroecology (T5.2)

Lead: CARI

CARI will organise webinars or face-to-face meetings at least at two/three key moments of the project by type of farming system (oases, cereal plains, peri-urban vegetable production…), including three face-to-face meetings in Morocco (led by RIAM), France, and Mauritania (led by TENMYA). Those meetings will allow to share findings across and beyond the case study areas, including AEP combinations and their contribution to AE transitions, methodological approaches and evaluation findings. (NATAE project document).

5.1.3 Multi-actor capitalization

Lead: WU

A comparative analysis of project findings at LL levels, will be synthetized in a joint report by WU with support from other project partners in particular UICN and OSS (D5.3), and discussed within working groups organised by CARI to support the capitalization of NATAE project findings for science, communication (WP5), policies (WP6), and education and extension (WP7), to be disseminated in the most adequate formats for each target audience. Those target-oriented capitalization findings will feed in the production of scientific papers, as well as communication, outreach and advocacy content (T5.1 and T6.1). (NATAE project document).

5.2 EU-compliant policies to foster AE transition in North African countries (WP6)

Work package 6 has stakeholder activities that are not directly included in WP4.

Lead: ZALF

Period: Dec ’23 – Dec ‘26

Main stakeholder activities:

- Policy co-design in a LL representative board workshop (T6.2.1; May-June ’24; 1 day)
- Evaluating internal and external factors for policy design in a stakeholder workshop (T6.2.2; April 24-June ’24; ½ day)
- Evaluation of policy options in a LL representative board workshop (T6.2.2; Jul-Sep ’24; 1 day, or two half days)

5.2.1 Co-design of relevant policy options with project partners and living lab actors (T6.2.1)

Lead: IAV

Period: Dec ’23 – Dec ‘24

This task aims to **co-design policy options with stakeholders**, based on previous tasks, in particular T2.3, T4.4 and T6.1. In this task, novel policy options among options pre-identified by IAV and the other partners of the task - based on early stakeholder consultation and a procedure that will be determined by IAV - are discussed, adjusted and filtered in the LL representative board workshops in each LL (2x ½ day; May-June ’24; Figure 8).

5.2.2 Evaluation of policy options by experts from the living labs (T6.2.2)

Lead: ZALF

Period: April ’24 – Dec ‘25In a first **workshop** (April-June ’24; ½ day) **with farmers and other value chain actors** (Figure 8), the decision-making environment is identified relating to its strengths, weaknesses, opportunities and threats (SWOT). The workshop has an emphasis on gathering data from participants that can be used for the modelling exercise on the effect of policies on the agroecological transition. Mainly **questionnaires with data tables** to be filled will be used, but there will also be room for discussion. Synergies may be found with previous workshops organized for “T4.4 scenarios, indicators and co-design of AEP combinations” (Dec ‘23/Jan ‘24).

Based on the data provided by participants in the first workshop and based on the set of policy options from T6.2.1, value chain experts will be consulted in individual **interviews**. In these interviews, the experts are asked to determine the importance of the identified strengths, weaknesses, opportunities and threats. Policy options will be summarized in a SWOT-matrix, considering internal strengths and weaknesses and external opportunities and threats.

The selected policy options (based on T6.2.1 & SWOT-matrix of T6.2.2) will serve as input to the evaluation of policy combinations in **a LL representative board workshop** (Figure 8) that takes place in the period from July - September ’24. As the workshops will make use of the previous SWOT-analyses, LL-research partners are expected to construct a presentation that explains the SWOT-

method accompanied with examples. These workshops are expected to take one day (or two half days), allowing more time for discussion amongst stakeholders, thus providing more opportunity for relationship building between actors and researchers. During these LL representative board meetings, links could be made with activities related to T4.5 “experimentation and demonstration”. The policy evaluation workshops will be complementary to the policy simulations (T6.3).

In total, **one to two person months for preparation and reporting by LL-research partners** are foreseen. It should be noted that the amount of time required from LL-research partners will increase when more complex and a higher number of value chains need to be discussed.

5.3 Establishing synergies with policy makers and investors to support their decisions (T6.4)

Lead: CARI

Period: Aug ’24 – Dec ‘26

In this task, policies will be discussed at high-level events with policy makers and potential investors. NATAE research partners involved in this task (CARI, IAMM, SPI, UICN, and OSS) will dedicate time for this. LL-Leaders and/or LL-facilitators will be invited to participate to share in-depth knowledge, insights and to take part in the decision-making process. They are also needed to identify decision makers and relevant events for advocacy (in which they could contribute themselves as well). **Other than that, no time is expected from LL-research partners in this task.**

5.4 Education and training (WP7)

5.4.1 Field schools (T7.2)

Lead: INAT

Period: Jan ’24 – March ‘26

Universities in NATAE will organize at least 3 field schools, bringing together Masters or engineering students from one or more Mediterranean countries, around the experience of a LL territory. These field schools will build a common culture among students and local actors, building shared diagnoses through exchanges with local stakeholders on traditional knowledge, knowledge of producer-experimenters, knowledge of field extension workers, etc. (NATAE project document).

5.4.2 Professional training (T7.3)

Lead: ICARDA

Period: Nov ’23 – March ‘26

Based on the conclusions of a review and analysis of existing education programmes and propositions for new curricula and content (T7.1), LL Leaders will pilot, with technical input from ICARDA and other key technical partners, innovative professional training courses for actors in the value chains, and professional farm advisors. At least 2 innovative courses will be piloted in each LL area, building on the resources offered by existing local training facilities (e.g. farm schools) in the LL areas. Those existing facilities will thus be strengthened and networked within the framework of the project. Building

on the results of those pilot courses, replicable training content and approaches will be produced under the coordination of ICARDA (D7.1). With support from SPI, training content and approaches will be presented in didactic booklets for future trainers to use, including training material in national languages (D7.2). Those booklets will be discussed locally, through multi-actor workshops, and readjusted on the basis of those discussions to ensure that they are adapted to the different agro-socio-economic contexts in NATAE and ready for adoption. They will be the basis for the elaboration of practice abstracts (D7.3). (NATAE project document).

The innovative courses will probably take place in the context of T4.5 where ICARDA is also the lead partner. One could, for instance, think about a training on co-designing an experiment.

The discussion on the content of the booklets will be done by the LL representative board.

5.4.3 Young researcher schools (T7.4)

Lead: IAV

Period: March ’24 – June ‘26

Two young researcher schools will be organised in the second and fourth project year, respectively by IAV and ENSA. Both will focus on the interdisciplinary and transdisciplinary elaboration of assessment tools on the impact of AEP combinations. The first school will offer tools and reflections to understand farmer production strategies, the levers and barriers for AEP adoption and how to assess their potential benefits at the LL level. The second school will put emphasis on the necessary combination of qualitative and quantitative approaches to deliver value chain analyses and assessments at food system level. Trainers and young researchers from IAMM, IAMB, MAICh, IUCN, CARI, UoS, UoP, UoC, UTH will participate in this activity. (NATAE project document).

Chapter 6

Conclusion

6. Conclusion

In this document, guidelines are provided to set-up, run and monitor Living Labs in a North African context. These Living labs have the aim to identify and test combinations of agroecological practices and scale them up and out. This is envisioned through the implementation of transdisciplinary research involving researchers and local actors. In parallel, the Living Labs contribute to a different way of governing agricultural innovations in which farmers have an important voice. As a working definition, we argue that **NATAE Living Labs will become self-organized places of structural exchange between local food system actors on the identification and testing of combinations of agroecological practices while working towards a joint vision for and implementation of an agroecological transition.** At a practical level, the Living Lab guidelines aim to align the stakes and capacities of LL-leaders, LL-actors and external researchers. Due to the differences between Living Labs, flexibility is required regarding the proposed methodology, i.e. the methodologies need to be tailored to each LL. When tailoring the methodologies, transparency and accountability is needed in order to be able to (re-)evaluate the Living Lab methodology and results. Such an evaluation is much needed as the application of the Living Lab approach in an agricultural context is still surrounded with vagueness and many uncertainties. Well-documented implementation of the proposed methodology in this document is expected to provide some empirical evidence about the factors involved in the success of the Living Lab approach in a Northern African agricultural context.

Bibliography

Bibliography

Alvarez, S., Paas, W., Descheemaeker, K., Tittonell, P., Groot, J., 2014. Typology construction , a way of dealing with farm diversity General guidelines for Humidtropics, Report for the CGIAR Research Program on Integrated Systems for the Humid Tropics.

Alvarez, S., Timler, C.J., Michalscheck, M., Paas, W., Descheemaeker, K., Tittonell, P., Andersson, J.A., Groot, J.C.J., 2018. Capturing farm diversity with hypothesis-based typologies: An innovative methodological framework for farming system typology development. PLoS One 13, e0194757. https://doi.org/10.1371/journal.pone.0194757

Barrios, E., Gemmill-Herren, B., Bicksler, A., Siliprandi, E., Brathwaite, R., Moller, S., Batello, C., Tittonell, P., 2020. The 10 Elements of Agroecology: enabling transitions towards sustainable agriculture and food systems through visual narratives. Ecosyst. People 16, 230–247. https://doi.org/10.1080/26395916.2020.1808705

Beaudoin, C., Joncoux, S., Jasmin, J.-F., Berberi, A., McPhee, C., Schillo, R.S., Nguyen, V.M., 2022. A research agenda for evaluating living labs as an open innovation model for environmental and agricultural sustainability. Environ. Challenges 7, 100505. https://doi.org/https://doi.org/10.1016/j.envc.2022.100505

Beza, E., Steinke, J., van Etten, J., Reidsma, P., Fadda, C., Mittra, S., Mathur, P., Kooistra, L., 2017. What are the prospects for citizen science in agriculture? Evidence from three continents on motivation and mobile telephone use of resource-poor farmers. PLoS One 12, 1–26. https://doi.org/10.1371/journal.pone.0175700

Biggs, R. (Oonsie), Westley, F., Carpenter, S.R., 2010. Navigating the Back Loop: Fostering Social Innovation and Transformation in Ecosystem Management. Ecol. Soc. 15, 9.

Bolwig, S., Ponte, S., Du Toit, A., Riisgaard, L., Halberg, N., 2010. Integrating Poverty and Environmental Concerns into Value-Chain Analysis: A Conceptual Framework. Dev. Policy Rev. 28, 173–194. https://doi.org/10.1111/j.1467-7679.2010.00480.x

Boughamoura, O., Requier-Desjardins, M., Lemaitre-Curri, E., 2022. Quelle transition agro-ecologique en Afrique du Nord? Une lecture a partir de 92 projets d'agriculture durable. Project MEDEA. CIHEAM-IAMM / AUF.

Castleden, H., Garvin, T., First Nation, H., 2008. Modifying Photovoice for community-based participatory Indigenous research. Soc. Sci. Med. 66, 1393–1405. https://doi.org/10.1016/j.socscimed.2007.11.030

Chambers, J.M., Wyborn, C., Klenk, N.L., Ryan, M., Serban, A., Bennett, N.J., Brennan, R., Charli-Joseph, L., Fernández-Giménez, M.E., Galvin, K.A., Goldstein, B.E., Haller, T., Hill, R., Munera, C., Nel, J.L., Österblom, H., Reid, R.S., Riechers, M., Spierenburg, M., Tengö, M., Bennett, E., Brandeis, A., Chatterton, P., Cockburn, J.J., Cvitanovic, C., Dumrongrojwatthana, P., Paz Durán, A., Gerber, J.D., Green, J.M.H., Gruby, R., Guerrero, A.M., Horcea-Milcu, A.I., Montana, J., Steyaert, P., Zaehringer, J.G., Bednarek, A.T., Curran, K., Fada, S.J., Hutton, J., Leimona, B., Pickering, T., Rondeau, R., 2022. Co-productive agility and four collaborative pathways to sustainability transformations. Glob. Environ. Chang. 72, 102422. https://doi.org/10.1016/J.GLOENVCHA.2021.102422

de Haan, J. (Hans), Rotmans, J., 2011. Patterns in transitions: Understanding complex chains of change. Technol. Forecast. Soc. Change 78, 90–102. https://doi.org/10.1016/j.techfore.2010.10.008

Di Méo, G., 1998. De l'espace aux territoires : éléments pour une archéologie des concepts fondamentaux de la géographie. Inf. Geogr. 62, 99–110. https://doi.org/10.3406/ingeo.1998.2586

Enfors-Kautsky, E., Järnberg, L., Quinlan, A., Ryan, P., 2021. Wayfinder: a new generation of resilience practice. Ecol. Soc. 26. https://doi.org/10.5751/ES-12176-260239

Enfors-Kautsky, E., Järnberg, L., Quinlan, A., Ryan, P., 2018. Wayfinder: a resilience guide for navigating towards sustainable futures [WWW Document]. GRAID Program. Stock. Resil. Centre. URL https://wayfinder.earth/ (accessed 6.1.21).

Feindt, P.H., Meuwissen, M.P.M., Balmann, A., Finger, R., Mathijs, E., Paas, W., Soriano, B., Spiegel, A., Urquhart, J., Reidsma, P., 2022. Understanding and Addressing the Resilience Crisis of Europe's Farming Systems: A Synthesis of the Findings from the SURE-Farm Project, in: Garrido, A., Spiegel, A., Soriano, B., Mathijs, E., Urquhart, J., Meuwissen, M.M.P., Feindt, P.H. (Eds.), Resilient and Sustainable Farming Systems in Europe: Exploring Diversity and Pathways. Cambridge University Press, Cambridge, pp. 342–374. https://doi.org/DOI: 10.1017/9781009093569.021

Geels, F.W., 2011. The multi-level perspective on sustainability transitions: Responses to seven criticisms. Environ. Innov. Soc. Transitions 1, 24–40. https://doi.org/10.1016/J.EIST.2011.02.002

Giller, K.E., Leeuwis, C., Andersson, J.A., Andriesse, W., Brouwer, A., Frost, P., Hebinck, P., Heitkönig, I., Van Ittersum, M.K., Koning, N., Ruben, R., Slingerland, M., Udo, H., Veldkamp, T., Van de Vijver, C., Van Wijk, M.T., Windmeijer, P., 2008. Competing claims on natural resources: What role for science? Ecol. Soc. 13(2), 34.

Hardesty, S., Feenstra, G., Visher, D., Lerman, T., Thilmany-McFadden, D., Bauman, A., Gillpatrick, T., Rainbolt, G.N., 2014. Values-Based Supply Chains. Econ. Dev. Q. 28, 17–27. https://doi.org/10.1177/0891242413507103

Harvey, B., Ensor, J., Garside, B., Woodend, J., Naess, L.O., Carlile, L., 2013. Social learning in practice: A review of lessons, impacts and tools for climate change. CCAFS Working Paper no. 38. CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS). Copenhagen, Denmark.

Hearn, G., Roodhouse, S., Blakey, J., 2007. FROM VALUE CHAIN TO VALUE CREATING ECOLOGY. Int. J. Cult. Policy 13, 419–436. https://doi.org/10.1080/10286630701683367

Hollander, J.A., 2004. The Social Contexts of Focus Groups. J. Contemp. Ethnogr. 33, 602–637. https://doi.org/10.1177/0891241604266988

Jalkh, R., Lemaitre-Curri, E., Requier-Desjardins, M., 2023. D8.2 Project Ethics Guidelines. NATAE European Horizon project no. 101084647.

Kaplinsky, R., Morris, M., 2000. A handbook for value chain research. Brighton, University of Sussex, Institute of Development Studies.

König, H.J., Uthes, S., Schuler, J., Zhen, L., Purushothaman, S., Suarma, U., Sghaier, M., Makokha, S., Helming, K., Sieber, S., Chen, L., Brouwer, F., Morris, J., Wiggering, H., 2013. Regional impact assessment of land use scenarios in developing countries using the FoPIA approach: Findings from five case studies. J. Environ. Manage. 127, S56–S64. https://doi.org/10.1016/j.jenvman.2012.10.021

Kremen, C., Iles, A., Bacon, C., 2012. Diversified Farming Systems: An Agroecological, Systems-based Alternative to Modern Industrial Agriculture. Ecol. Soc. 17.

Leminen, S., Westerlund, M., Nyström, A.-G., 2012. Living Labs as Open-Innovation Networks. Technol. Innov. Manag. Rev. 2, 6–11. https://doi.org/http://doi.org/10.22215/timreview/602

Levard, L., Mathieu, B., Masse, P., 2019. Handbook for the evaluation of agroecology: a method to evaluate its effects and the conditions for its development.

Luederitz, C., Schäpke, N., Wiek, A., Lang, D.J., Bergmann, M., Bos, J.J., Burch, S., Davies, A., Evans, J., König, A., Farrelly, M.A., Forrest, N., Frantzeskaki, N., Gibson, R.B., Kay, B., Loorbach, D., McCormick, K., Parodi, O., Rauschmayer, F., Schneidewind, U., Stauffacher, M., Stelzer, F., Trencher, G., Venjakob, J., Vergragt, P.J., von Wehrden, H., Westley, F.R., 2017. Learning through evaluation – A tentative evaluative scheme for sustainability transition experiments. J. Clean. Prod. 169, 61–76. https://doi.org/10.1016/j.jclepro.2016.09.005

Marinus, W., Descheemaeker, K.K.E., van de Ven, G.W.J., Waswa, W., Mukalama, J., Vanlauwe, B., Giller, K.E., 2021. "That is my farm" – An integrated co-learning approach for whole-farm sustainable intensification in smallholder farming. Agric. Syst. 188. https://doi.org/10.1016/j.agsy.2020.103041

McPhee, C., Bancerz, M., Mambrini-Doudet, M., Chrétien, F., Huyghe, C., Gracia-Garza, J., 2021. The defining characteristics of agroecosystem living labs. Sustain. 13, 1 – 25. https://doi.org/10.3390/su13041718

Morris, J.B., Tassone, V., de Groot, R., Camilleri, M., Moncada, S., 2011. A framework for participatory impact assessment: Involving stakeholders in European policy making, A case study of land use change in Malta. Ecol. Soc. 16, 12.

Mosse, D., 1994. Authority, Gender and Knowledge: Theoretical Reflections on the Practice of Participatory Rural Appraisal. Dev. Change 25, 497–526. https://doi.org/10.1111/j.1467-7660.1994.tb00524.x

Paas, W., Accatino, F., Bijttebier, J., Black, J.E., Gavrilescu, C., Krupin, V., Manevska-Tasevska, G., Ollendorf, F., Peneva, M., San Martin, C., Zinnanti, C., Appel, F., Courtney, P., Severini, S., Soriano, B., Vigani, M., Zawalińska, K., van Ittersum, M.K., Meuwissen, M.P.M., Reidsma, P., 2021a. Participatory assessment of critical thresholds for resilient and sustainable European farming systems. J. Rural Stud. 88, 214–226. https://doi.org/10.1016/J.JRURSTUD.2021.10.016

Paas, W., Coopmans, I., Severini, S., van Ittersum, M., Meuwissen, M., Reidsma, P., 2021b. Participatory assessment of sustainability and resilience of three specialized farming systems. Ecol. Soc. 26, 2. https://doi.org/https://doi.org/10.5751/ES-12200-260202

Paas, W., San Martín, C., Soriano, B., van Ittersum, M.K., Meuwissen, M.P.M., Reidsma, P., 2021c. Assessing future sustainability and resilience of farming systems with a participatory method: A case study on extensive sheep farming in Huesca, Spain. Ecol. Indic. 132, 108236. https://doi.org/10.1016/j.ecolind.2021.108236

Pielke, R.A., 2007. The honest broker: Making sense of science in policy and politics. Cambridge University Press, UK. https://doi.org/10.1017/CBO9780511818110

Ravetz, J., 2002. The challenge beyond orthodox science. Futures 34, 200–203. https://doi.org/10.1016/S0016-3287(01)00060-X

Ribot, J., 2004. Waiting for democracy: The politics of choice in natural resource decentralization.

Ronner, E., van de Ven, G.J., Nowakunda, K., Tugumisirize, J., Kayiita, J., Taulya, G., Uckert, G., Descheemaeker, K.K.E., 2023. What future for banana-based farming systems in Uganda? A participatory scenario analysis. Agric. Syst. 209, 103669. https://doi.org/10.1016/j.agsy.2023.103669

Rossing, W.A.H., Albicette, M.M., Aguerre, V., Leoni, C., Ruggia, A., Dogliotti, S., 2021. Crafting actionable knowledge on ecological intensification: Lessons from co-innovation approaches in Uruguay and Europe. Agric. Syst. 190, 103103. https://doi.org/10.1016/j.agsy.2021.103103

Schäpke, N., Stelzer, F., Caniglia, G., Bergmann, M., Wanner, M., Singer-Brodowski, M., Loorbach, D., Olsson, P., Baedeker, C., Lang, D.J., 2018. Jointly Experimenting for Transformation?

Shaping Real-World Laboratories by Comparing Them. GAIA - Ecol. Perspect. Sci. Soc. 27, 85–96. https://doi.org/10.14512/gaia.27.S1.16

Schut, M., Klerkx, L., Rodenburg, J., Kayeke, J., Hinnou, L.C., Raboanarielina, C.M., Adegbola, P.Y., van Ast, A., Bastiaans, L., 2015. RAAIS: Rapid Appraisal of Agricultural Innovation Systems (Part I). A diagnostic tool for integrated analysis of complex problems and innovation capacity. Agric. Syst. 132, 1–11.

Sellberg, M.M., Cockburn, J., Holden, P.B., Lam, D.P.M., 2021. Towards a caring transdisciplinary research practice: navigating science, society and self. Ecosyst. People 17, 292–305. https://doi.org/10.1080/26395916.2021.1931452

Steen, K., van Bueren, E., 2017. The Defining Characteristics of Urban Living Labs. Technol. Innov. Manag. Rev. 7, 21–33. https://doi.org/http://doi.org/10.22215/timreview/1088

Thuijsman, E.S., den Braber, H.J., Andersson, J.A., Descheemaeker, K., Baudron, F., López-Ridaura, S., Vanlauwe, B., Giller, K.E., 2022. Indifferent to difference? Understanding the unequal impacts of farming technologies among smallholders. A review. Agron. Sustain. Dev. 42, 41. https://doi.org/10.1007/s13593-022-00768-6

Wang, C., Burris, M.A., 1997. Photovoice: Concept, Methodology, and Use for Participatory Needs Assessment. Heal. Educ. Behav. 24, 369–387. https://doi.org/10.1177/109019819702400309

Westley, F., Laban, S., Rose, C., McGowan, K., Robinson, K., Tjornbo, O., Tovey, M., 2015. Social Innovation Lab Guide.

Wigboldus, S., Leeuwis, C., 2013. Towards responsible scaling up and out in agricultural development: an exploration of concepts and principles. Centre for Development Innovation, Wageningen University & Research.

Appendices

Appendix A. Living Lab information

This appendix provides detail on the local context in the selected LL. The level of available details differs from LL to LL.

Stakeholder experience in LLs

The farmers and other stakeholders in the LLs are used to participating in surveys, workshops and on-farm experiments. On-farm experiments are so far mostly organized in a top-down way. Risk insurance for on-farm experiments will be key in all LL.

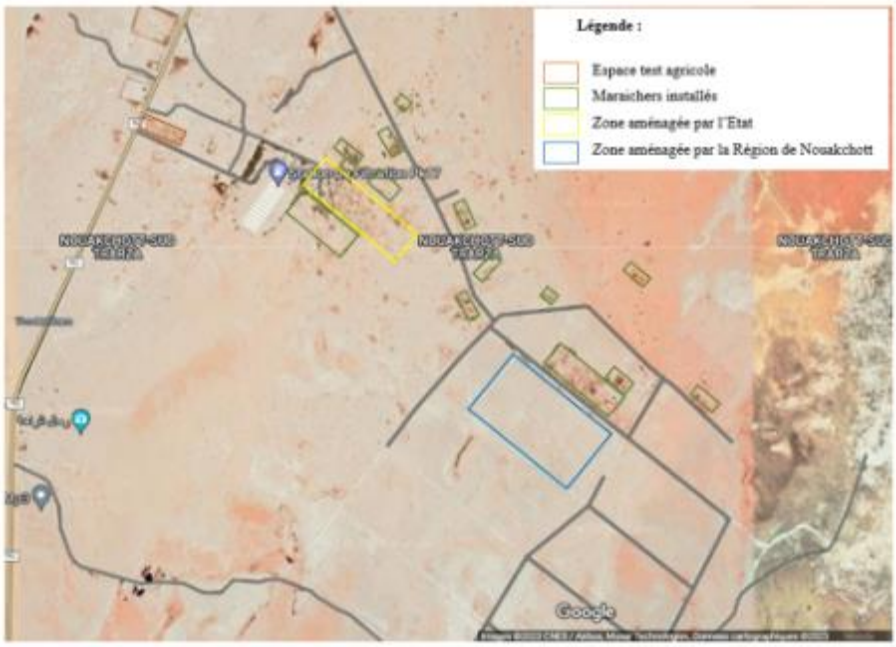
At the moment, there is no experience with a Living Lab process in the LLs. Existing ties of LL-leaders seem a promising start for involving local stakeholders. Finding about 10 LL representative board members for the Living Lab process is expected to be feasible.

LL-Nouakchott, Mauritania

Lead: GRDR

Location

This LL is located in the South of the Wilaya (region) of Nouakchott, in the department of Riyadh and more precisely in the peri-urban area of PK-17, road linking the two Regions Nouakchott and Trarza (Figure A1). It is one of the most vulnerable areas of Nouakchott. Its inhabitants, especially men who work in the tertiary trades, usually leave in the morning to go to work in the other communes of Nouakchott and return in the evening because work opportunities are lacking in Riyadh.



- **Figure A1: Map of the PK-17 area (Source: Google Maps)**

Since 2016, we see that the State, the Nouakchott Region and development partners (FAO, EU) support the exploitation of arable land to allow farmers to develop market gardening activities in the PK-17 area where the Nouakchott water filtration and distribution plant is located (Figure A1).

Farm types

At PK17, more than 300 people develop vegetable production activities on soil that is generally sandy. The average annual rainfall is around 47 mm (source: ONM). We see a recent explosion of chicken farming that has been in the neighborhoods of Riyadh and lately in the PK-17 area. Households are generally vulnerable. Most of the men work outside Riyadh. As the age pyramid of the commune of Riyadh is not available, the data for Nouakchott provides a more global idea of the distribution of ages and sexes (Figure A2).

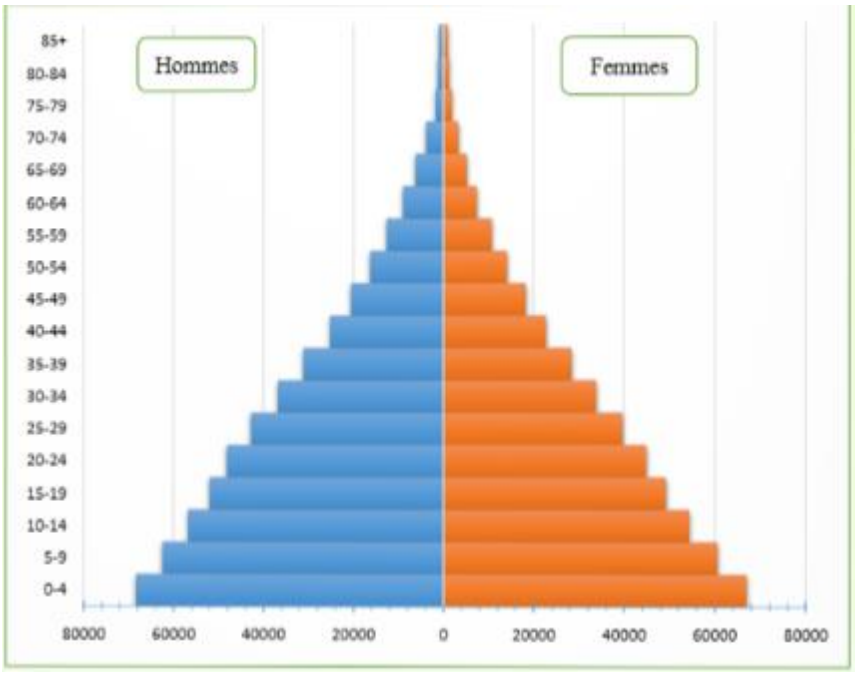


Figure A2: Population pyramid of the city of Nouakchott (source: ONS-RGPH 2013)

Market gardening in the PK17 area is dominated mainly by men with only about 5% of women market gardeners. There are about 300 farmers in the area (Figure A1). Most of the plots are occupied by market gardeners who are over 35 years old (source: Grdr 2020). Most recently, with the projects implemented by the GRDR and the Nouakchott Region, there are more and more young people and women who are interested in market gardening.

In the PK-17 area, there are 3 types of market gardeners:

- - Those installed around the filtration station;
- - Autonomous or illegally installed in the PK-17 area;
- - And those installed in the perimeter developed by the Nouakchott region.

- **Farmers around the filtration station**

They are farmers, most of whom are retired soldiers, who had benefited from a subdivision of land allocated by the state in 2016. These are 78 plots of land of 625 m2 fenced and providing emergency

support to people in precarious situations. This land was intended for agricultural purposes (market gardening). To complete the action, the State had entrusted the Ministry of Agriculture with the monitoring and installation of an alternative power station (solar and continuous). The washing water, rinsing of the basins of the filtration station are recovered in a second basin. Some of this water is discharged in PVC pipes more than 800 meters to allow to retired soldiers and others established farmers who take advantage of this water to irrigate. Manual watering is used by market gardeners to bring water to the plant.

- **Autonomous or illegally installed in the PK-17 area**

The second part of the filtration water recovered in the second basin is discharged onto a lost channel over a large expanse of previously unoccupied space. The presence of water in the area has attracted some farmers, some of whom may have occupied this space illegally. The occupied areas vary from 400 to 10,000m2 generally fenced. Some farmers, located not far from this discharge channel, have installed suction pumps to supply their plot. Others, more affluent and installed even further from the canal, proceed to a connection of the National Water Company. There are few market gardeners who have dug wells to supply their plot with water. Manual watering is used to bring water to the plants.

- **Market gardeners installed in the site developed by the Nouakchott Region**

This site is the result of an agreement at the end of 2020 between the Nouakchott Region and the Ministry of Agriculture in which 10 ha was rented to the Nouakchott Region for the implementation of this activity. After the fencing and earthworks of this area, the site was the subject of a complete agricultural development plan validated by the Region, giving the possibility of exploiting 130 fields of nearly 700 m2 by individuals and agricultural cooperatives and 6 greenhouses of 140 m2 each for experiments. This site is supplied with water by a connection from the National Water Company. All the necessary arrangements have been taken into consideration in terms of compost preparation and a cultivation plan identifying the choice of possible alternations. The drip irrigation system is used to supply water to the plants.

Market gardening and plot management

Soil type, fertilization, phytosanitary treatments

The soil of the PK-17 area is sandy with a high infiltration capacity. The soils are not very fertile, farmers provide organic manure so that they are suitable for market gardening and retain water in the root zone. The majority of those who occupy the plots put the entire bag of manure in their water storage basin to fertigate their crops. Other market gardeners spread manure or compost on the crop ridges. Les engrais chimiques sont utilisés en complément. Against pests and crop diseases, chemical pesticides are widely used even if some farmers use natural products that they prepare themselves. The farmers use mechanical or natural windbreaks such maralfalfa *(pennisetum sp)* which was introduced by Agri-Sahel as part of the SAFIRE project.

Crops cultivated and their importance in monetary income

In the PK17 area, 11 speculations were considered important from a monetary point of view are sown by market gardeners. Among these speculations, from one site to another 4 emerge to be more important than the others. These are in order of importance leaf onion, mint, turnip and lettuce. The other crops produced are carrot, parsley, eggplant, beetroot, okra, potato and pepper.

Water sources

The average annual rainfall of 47 mm is not exploited. The water sources encountered at pK17 are of 3 types:

- Use of water discharged by the filtration plant;
- Use of connections of the National Water Company;
- Digging wells: not very deep-water table (7 to 10 m).

Irrigation water is usually stored in tanks or storage basins. The tanks have a capacity of 1000 to 3000 liters used. Regarding the basins, there are generally 3 different volumes of water storage basins depending on the means of the operator: 18m3, 13.5m3 and 9m3.

6.1.1.1 The different markets for the supply of agricultural materials, equipment and inputs and for the sale of vegetables.

For the supply of materials, equipment and agricultural inputs (fertilizers, seeds, pesticides ...) and , producers visit the various markets of the centre of Nouakchott (Capital, Socim, Clinic, Chicken and Fish Markets) and those of Riyadh (PK7, PK10, Tarhil etc.).

Manure is found at PK17 chicken farmers, Riyadh neighbourhoods and Chicken Market. Some seed varieties are self-produced in plots.

After harvesting vegetables, some of the products are self-consumed and a large part is sold directly to the plot, in the neighbourhoods, at neighbours or to intermediaries in the markets in the centre of Nouakchott, Teyarett markets, Riyadh markets and the weekly market of Zeyn'Art which is the only recognized agroecological products market.

6.1.1.2 Some technical itineraries

6.1.1.2.1 Crop associations

The cultural associations that are most encountered in the market gardeners who practice them are onion-lettuce or chili-lettuce.

6.1.1.2.2 Crop rotation

Unlike crop association, crop rotation is practiced by a large proportion of market gardeners. The main crop rotations brought to our attention are: R1: Turnip – Carrot – Mint; R2: Mint – Lettuce – Leaf Onion; R3: Lettuce – Mint – Leaf onion. Those who do not alternate crops usually produce only mint.

6.1.1.2.3 *Production periods*

The vegetable production period is generally all the year depending on the variety, with decreases in production reported during the winter period and from October to December when temperatures are low.

Problem statement and preliminary research directions

Most consumed vegetables in Nouakchott are imported from Morocco, Senegal and Western Europe. After the COVID-19 sanitary crisis and the energy crisis, food prices have inflated. The national government calls for a more local production of vegetables.

Sanitary quality of vegetables is questioned because of the unknown quality of the water that is used. In addition, the used of poultry droppings poses questions.

Agroecology practices seem to work, but are too capital intensive and depend too much on external inputs. The agroecological practices tested also lead to crops that could only target niche markets.

Secured land and access to water are an issue for most of the farmers and a precondition for implementing agroecological practices.

Ideally, agroecological practices addressed would have low negative environmental impact, rely mainly on local, self-produced resources and rely on fair trade principles.
Production and market issues need to be addressed simultaneously. So far, agroecological practices are more labour intensive and lead to equal or higher yields. Higher yields alone don't compensate for higher labour use. Therefore, market prices need to increase as well.

LL-Meknes, Moroc

Lead: ENAM

Location

For LL-Meknes, the focus will be on the vegetable producing upstream area of the 'oued' of Ouislane (Figure A3). In this particular area, the water used for irrigation is still relatively clean compared to the situation downstream and in other watersheds around Meknes. This makes that when identifying and testing agroecological practices, the attention is not too much diverted by water quality issues. This upstream part area is estimated to have 20-30 vegetable producing farmers. More farmers could be included if also downstream parts are included in the LL.

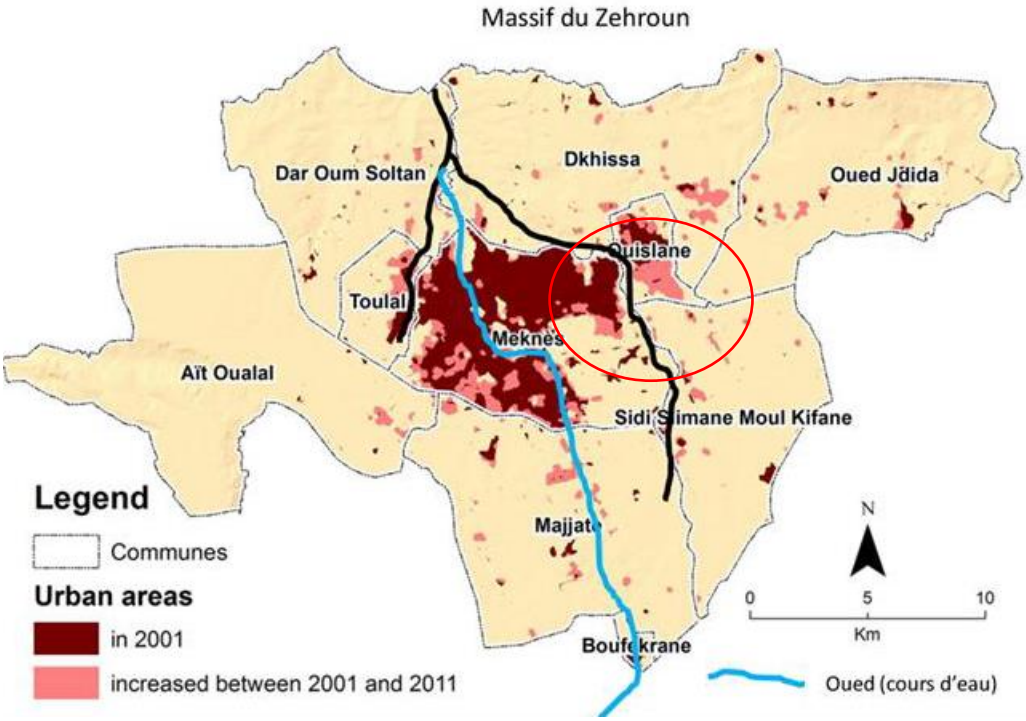


Figure A3. Location of LL-Meknes.

Agricultural activities

In Meknes, mainly vegetables are cultivated (about 80% of farms), supplemented with some cereal, olive and fruit tree production. Also livestock activities occur in the area. The main vegetable crops that are grown are green bean, tomato and zucchini. The farm size ranges from 0.75 to 3 ha of which

about 70% is irrigated. About 90% of the farms rent land. Income from agriculture is low and often lower than the minimum wage in town. However, this is compensated by food self-sufficiency. Selling goes via wholesale (75%) and retail market traders or collectors (20%). 5% of the produce is directly sold to consumers.

Rainfall ranges usually from about 200 till 500 mm / year. Temperature ranges from 16^{o}C in January till 34^{o}C in July. However, there can be periods of very hot weather with temperature peaks of up to 45^{o}C.

Problem statement and preliminary research directions

Peri-urban farming is not recognized by policy and decision makers as being important for local and national food security.

Farm size and limited land rights in combination with low productivity threaten the economic viability of farms. The quality of the produce may also be an issue for certain vegetables.

Market access is another challenge.

Lack of technical and organizational support from local and national governmental organizations is limiting the possibilities to address production and market challenges.

Farmers do use synthetic inputs for their production. In fact, it is hard to point at any current practice that could qualify as ‘agroecological’. For research directions, ideas may need to be borrowed from other areas outside the LL.

LL-Boulemane, Moroc

Lead: ENAM

Location

For LL-Boulmane, no final community is selected yet, but ENAM is in touch with several communities.

This community will be representative for the agricultural system in Boulmane. The total surface of Boulmane region measures about 1,5 million hectares of which 84,000 ha is cultivated (about 33,000 ha is irrigated) by about 32,000 farmers.

Agricultural activities

In Boulmane, the main crops in terms of cultivated area are cereals (about 16,000 ha) and olive trees (about 11,000 ha). Other crops, such as nuts, fruit trees, vegetables (onion, potato, leguminous) and fodder have a cultivated area ranging from about 40 to 1600 ha. Also, aromatic and medicinal plants are cultivated. In Boulmane, livestock plays an important role with over 1 million goats and sheep and about 24,000 cattle

The farm size ranges from less than 5 ha (2/3 of farms) to over 20 ha.

The market is dominated by local middlemen and traders for international markets.

Income from agriculture is low, due to low production levels and small farm sizes in combination with a limited access to markets to valorize the produce.

Rainfall is usually about 475 mm / year. Summers are hot with some occasional rain.

Problem statement and preliminary research directions

Farm size and limited access to land for women in combination with low productivity threaten the economic viability of farms.

Market access and valorisation of local products is another challenge.

Lack of technical and organizational support regarding the implementation of agroecology. In fact, many traditional practices that are applied may qualify as being 'agroecological'. Their recognition and dissemination could be a way to valorise local products.

In the LL, farmers use few chemical inputs, e.g. for pest and disease management, that may be replaced by natural functions of ecosystems, provided those functions operate at adequate levels.

LL-Laghouat, Algeria

Lead: CARI

Location

Within the wilaya of Laghouat, two communes have been selected to be part of the living lab (Figure A4). These communes have been chosen because of the already-existing agroecological practices in date palm farms and the knowledge of engaged stakeholders.

Figure A4. The two selected date palm producing communities for creating the LL. Source: adapted from the PP NATAE kick-off meeting.

Farm types

Laghouat and El Assafia are ancient oasis systems. Nowadays, farming is mainly done in peri-urban areas and are threatened by city expansion. The oasis itself is not visible anymore. Our first data show that cultivation area ranges from 1 to 20 hectare with most farms between 5 and 8 hectares under extensive production levels. There is only a small part of the farmers that can live from their farm activities alone. Other farmers are dependent on off-farm income. Two types of farmers seem

to be represented (based on a first impression): some mostly advanced in age with a high know-how in date palm cultivation, and 'new' farmers that invest and that experiment (drones, electric irrigation valves). For those farmers, palm cultivation is also considered as an investment to anticipate retirement, and is not (yet) their main source of income. Most of the farmers have one or two permanent farm workers as well as seasonal workers. The availability of qualified labour is generally lacking. For instance, for the pollination of palm trees.

Agricultural activities

The farms are characterized by poly-culture including date palms, other fruit trees, olives, sheep/goats, alfalfa, cereals and vegetables. Growing other crops under date palms is only possible when the date palms are aged (and tall). Otherwise, competition is too high and there is a risk for too much humidity for the date palms due to evapotranspiration of the other crops. Dates are sensitive to humidity and will easily rot. The pollination of date palms takes place in March/April/May. Dates are harvested in Sep./Oct/Nov., peaches/apricots in May. Usually, the period from January until April is relatively quiet in terms of on-farm activities.

On the edges of the oasis, transhumance herders let their livestock graze from time to time. From the perspective of the sedentary farmers, the transhumance leads to overgrazing and desertification. The transhumance herders have relatively strong lobbying power and receive most of the government aid.

The soils in the area are alkaline (pH of 8-9) due to the calcareous mother material, which inhibits nutrient availability (e.g. P, Fe, Mn). The soils also contain a lot of stones and is naturally poor in Phosphorus. In combination with irrigation, nitrogen is relatively easily washed away in the soils.

Rainfall is about 150mm per year. Water for irrigation is extracted from groundwater layers. There is a first- and second-degree canalization for irrigation. Irrigation is done by flooding the field, where water stays in small depressions around the palm trees. There are no water rights system in place.

Conventional and agroecological practices

Crop Biodiversity

- Multiple crops: fruit trees, vegetables, olive trees, vineyards mainly
- Main variety date palm is the Deglet Nour, but often then are also around 10 more rare varieties grown
- Crop-livestock integration: bees, goats, donkeys
- Other plants such as the willow, whose hormones are used for grafting, and plants that support honey production by bees.

Reproduction: use of offshoots to grow new plants Crop protection

- Dates are protected against humidity by plastic sheets/bags starting from September
- No undergrowth with other crops during the maturation of dates in Sep-Nov.
- Irrigation reduced during maturation of dates.
- Birds help control parasitic worms in dates.
- Date twigs are protected by mosquito nets.
- No or very little phytosanitary products are used (mainly for vegetables)
- Use of biopesticides
- Wind breaks against sand storms

Water management

- **Irrigation at the immediate surrounding of palm trees**

Soil fertility management

- Manure application
- Compost (fixed and liquid)
- Green manures (around date palms)
- Palm snippets or complete palms dug in around other palms to decompose
- Nitrogen fixing fabacees around date palms or on other fields
- No use of chemical fertilizer (when applied it is often for other fruit trees, vegetables or young palms.
- When chemical fertilizer is applied, it is done punctually.
- Nitrogen is regularly applied in small doses from February until November.
- Occasional fertilization by the flooding of the river (Oued).

Weed management

- Manual weeding
- Weeding by grazing (sheep, donkey)
- Herbicide application during maturation of dates
- Palm snippets as ground cover around palms to avoid emergence of weeds.

Selling

- Local selling mostly (demand is higher than production)
- Vegetables are consumed by the household

Problem statement and preliminary research directions

Most identified threats are groundwater resources overexploitation, global warming, abandonment of agricultural activities by young men.

Small machinery for soil and crop management is generally lacking, but could help to improve the production process. For instance, machinery for climbing palm trees.

Farmers still expand their area now and then. On a new field, they try to match their crops with the soil fertility status, based on what they see regarding the natural vegetation. Providing agroecological support during expansion could be an interesting avenue of research.

LL-Siliana, Tuinisia

Lead: INAT

Location

For LL-Siliana, the focus will be on the cereal plains in the North and East of the governorate of Siliana (Figure A5). This region is estimated to have 9269 cereal growing farmers, representing 43% of the total number of cereal growing farmers in Tunisia. Siliana has a population of 228691 inhabitants. Almost 57% of population live in rural areas. The active agricultural population represents 27,2% of the total active population.

No specific community for organizing the LL has been selected yet.

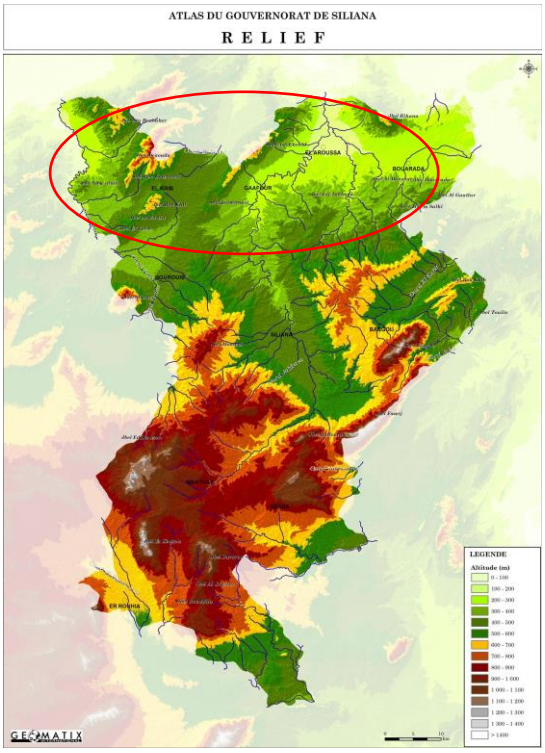


Figure A5. The governate of Siliana. The red oval roughly indicates the research area.

Farm types

In Siliana, cereals are cultivated in plains under rainfed conditions. About 80% of the farmers have a farm of around 10 hectares under extensive cultivation. Those farmers depend also on off-farm income to make a living. Land is often fragmented with parcels often smaller than 1 ha (Figure A6). The availability of labour is generally lacking.

Figure A6. Land fragmentation in Bouarada, Siliana. The white square indicates a surface of 1 ha.

Agricultural activities and conditions

The farms are characterized by monocultures of wheat and barley (>80% of the surface). These crops are typically sown in the end of November and harvested in May, beginning of June. Harvesting is done with hired machinery. Other edible crops include vegetables, chick peas, lentils and fenugreek,

but this is only for a small share of the land. Machinery is generally lacking for harvesting crops like chick peas and lentils. These crops also lack a market.

There is a high density of livestock in the area, mainly consisting of cows and sheep. Forage crops are grown to feed this livestock. Manure is used for fertilizing the fields.

The soils in the area are alkaline (pH of 8-9) which inhibits nutrient availability (e.g. P, Fe, Mn). Soil texture is highly diverse and ranges from sandy to loamy to clayey.

Rainfall in the Northern part of Siliana varies a lot from year to year between 380 till 460 mm per year. In the last four years there has been a drought affecting the crop yields. A very small part of the fields receive irrigation with water extracted from groundwater layers.

Problem statement and preliminary research directions

The presence of monocultures, low soil fertility, high risks of soil erosion are considered the main problems in the area. Agroecological practices can be used to tackle these problems, but are currently only implemented by a small fraction of the farmers. Lack of labour is another common problem.

INAT estimates that slowly introducing agroecology-based practices in combination with conventional practices is the best way to start an agroecological transition. Agroecological practices are often not implemented because they require investments and/or are not subsidized. The small area of most farms also doesn't allow farmers to experiment (and take some risk).

Promising AEP seem the introduction of other crops in the rotation. These crops are ideally fixing nitrogen and deep rooting to deal with the low soil fertility status. Introduction of more organic matter in the soils may be another agroecological practice. Agroecological practices should not increase the amount of labour. Enhancing symbiotic relationships between plants and fungi might be another option, but this is still in the experimental phase and probably too costly for farmers to implement on their farm.

LL-Luxor, Egypt

Lead: IAMM

The text for LL-Luxor is based on the farm typology guidelines provided in the context of WP2.

Location

The community of El-Boghdady is selected as living lab (Figure A7). This village shows a continuum between an urban area that remains relatively agricultural, and a rural area that is completely agricultural. It covers an area of 1,000 ha. In this living lab, agriculture employs at least 60% of the total population.

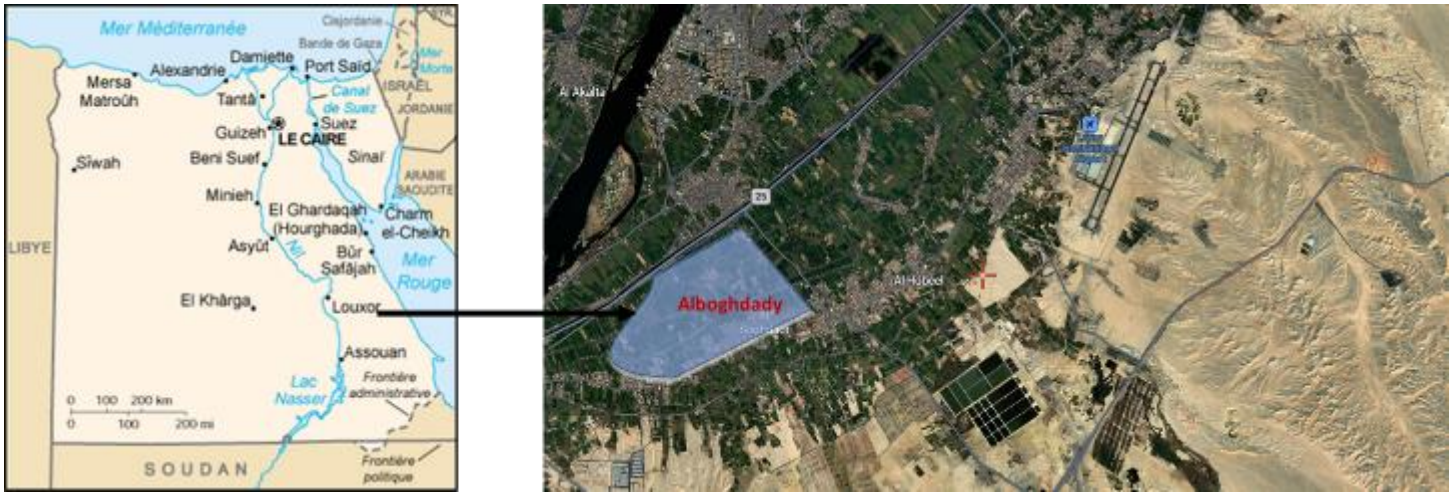


Figure A7. Geographical location of Alboghdady

Farm types

The fragmentation of agricultural land (over 80% of farmers have under 0.5 ha of agricultural land area) and the absence of a large investment capacity can largely account for the low income of agricultural households. The overall income of farm households mainly depends on agriculture. However, the share of off-farm income is higher in the urban area than in the rural area. This is mainly due to more pronounced pluri-activity in the urban area compared to the rural area.

Agricultural activities

In Luxor, just like everywhere else in Egypt, agriculture is fully irrigated. The average rainfall in Luxor is 170 mm/year. The local climate is temperate Mediterranean, with hot and dry summers. The only source of irrigation is the Nile.

This intensification is reflected in the cultivation of two successive crops on the same plot per year, and iv) the excessive use of phytosanitary products to control diseases and weeds (especially for sugarcane) largely due to the simplification of rotations.

Agricultural activity is not very diverse in this LL, and essentially includes cash crops such as sugar cane, food crops such as soft wheat and vegetable crops, and fodder crops (mainly clover, fodder maize and fodder sorghum) for livestock. Most farm households rear small numbers of farmyard animals (chickens, goats, buffaloes, pigeons, sheep, etc.) for the production of meat and milk, which is used primarily for their own consumption.

Farmers produce milk, meat, and small-scale market gardening mainly for their own consumption, fodder for their livestock, soft wheat primarily for their own consumption (the rest is often sold to the State first, and then on the local market), but mainly sugar cane for the State. Farmers have exclusive contracts with the Ministry of Supply and Internal Trade, which buys the entire production for processing.

Problem statement and preliminary research directions

The farmers in the village are all confronted with the same issue as many other villages in the city of Luxor and beyond. This issue is expressed by the nexus: fragmentation of agricultural land – low income – excessive pollution – limited access to irrigation water.

From an environmental point of view, four major issues can be noted: i) pollution caused by the burning of sugarcane residues, ii) the overexploitation of Nile water due to dilapidated, often open-air and inefficient irrigation networks. Surface irrigation is dominant in this LL, iii) the rapid loss of soil fertility (especially on land subject to long-term use) due to very intensive agriculture.

Appendix B. Invitation Letter for LL representative board members*

*This is an adapted version of the general “NATAE Living Labs – Invitation letter” as provided in the Ethical guidelines (NATAE project deliverable D8.2).

Instructions for LL-leader/LL-facilitator

The following consists of an invitation letter that you are free to use to invite relevant stakeholders to partake in the representative board of the Living Lab. If necessary, please translate this letter to the local language and communicate the translation to the Project Coordinator CIHEAM-IAMM for approval prior to dispatching. You are invited to conduct the invitation in various means you find suitable, including but not limited to printed form, email, or phone communication. Please make sure you register the means of communication you chose to circulate the invitation for traceability purposes.

Invitation letter

Dear Madam, Sir,

Under the framework of the NATAE project (Fostering agroecology transition in North Africa through multi-actor evaluation and networking), you are cordially invited to join as a LL representative board member of the **Insert Living Lab name here** located in **Insert area and country name here**. As a LL representative board member of the Living Lab, you will get the opportunity to share your vision and interact with a variety of different actors from the area around the project research topic of agroecological transition in North Africa. We see the transforming of agriculture in the context of climate change as a central challenge in North Africa, especially since the region is one of the most food-import-dependent worldwide and a climate change hotspot. We therefore consider that agroecology provides a potentially suitable solution to that issue and a contribution to challenges of global sustainability and local resilience.

The Living Lab approach aims to bring multiple actors together to participate collectively in the identification, testing and scaling up of suitable combinations of agroecological practices. Your expertise will help us comprehend local challenges and needs of different actors along the value chains. You can help identify existing and potential agroecological practices, important for future food systems.

The Living Lab approach is being applied in the NATAE project in six territories in five North African countries being Algeria, Morocco, Mauritania, Tunisia, and Egypt. Activities planned in each Living Lab are supported by a facilitator/coordinator under the supervision of NATAE’s Living Lab leaders.

NATAE is a research project funded by the European Union through the European Research Executive Agency (REA) under the Horizon Europe programme and with a contribution of the Government of Switzerland. The project is carried out by a consortium of 22 partner institutions coordinated by the Mediterranean Agronomic Institute of Montpellier (CIHEAM-IAMM).

For more information on the NATAE project, please refer to the official project website at https://www.natae-agroecology.eu/

What you will be asked to do

As a LL representative board member, you will be the first contact point of your stakeholder group, and the Living Lab leader from the NATAE project may contact you about the organization of activities. Interactions between the NATAE project members, the Living Labs LL representative board members and stakeholders are expected to entail a multiple of face-to-face and on-line activities. These include one-to-one surveys, focus groups discussions, workshops, training sessions and fields studies and visits.

You are particularly expected to participate in all LL representative board workshops in which you represent the interests and perspectives of your stakeholder group. Other stakeholder groups in the food system will be represented by other persons. The aim of the LL representative board workshops is to discuss agroecology beyond the farm level related to social, economic, environmental and institutional aspects. LL representative board workshops take place about three times a year, at least until the end of the project in 2026. Travel costs will be reimbursed and lunch will be provided.

Additionally, you will be invited to participate in all other stakeholder activities, such as focus group discussions and field visits.

To accept our invitation to join the stakeholder LL representative board of the Living Lab, kindly reply to this message by **Date DD/MM/YYYY**. As a LL representative board member you will be asked to sign a Consent Form to formalize participation. This will be communicated after we received a positive response.

Please do not hesitate to reach out to me for any questions. I look forward to hearing from you.

Best regards,

Insert facilitator name
Insert title
Living Lab Name / country
Contact info: email / phone

Location and date Signature of facilitator

Appendix C. Creating a code of good conduct

The list with ideas below to build a code of good conduct is based on the Wayfinder approach (Enfors-Kautsky et al., 2021) and adapted to the purposes of NATAE. The list was discussed by five small groups consisting of NATAE consortium members during the NATAE project meeting in Bari on 27 April 2023. Points in **bold** and *italic* received respectively much (selected by at least three groups) and little (selected by at most one group) support. After adaptation, points that received little support during the Bari-meeting may still be included in the agreement if that would suit a specific LL. Also points that received much support may need adaptation. Different points may also be combined in a new point. Additional points that are not in the list yet can also be added. LL-leaders will prepare a semi-final code of good conduct that they will discuss and adapt with the LL representative board. When an agreement is reached, the final code of good conduct will be shared with the LL representative board in written form and in the local language. There is no need to sign the list. An English version of the semi-final and final code of good conduct per LL will be shared on the NATAE NextCloud.

1. **We acknowledge the Living Labs (LL) as a safe space for exchange between stakeholder groups.**
2. We intend to bring change in our LL through the implementation of agroecological practices.
3. We strive for transparency and accountability and take responsibility in leading this process of change.
4. *We will do no harm and will not perpetuate disadvantage and injustices in our LL.*
5. *We acknowledge and challenge[6] power dynamics, where required, for realizing change.*
6. **We acknowledge and respect that there are multiple legitimate viewpoints and sources of knowledge.**
7. We commit to a reflexive, system thinking practice and will challenge our own biases and assumptions.
8. **We are willing to continuously adapt our activities to changing circumstances.**
9. We will work at the interface between research and devolpment, involving researchers, farmers and other practitioners, managers and government actors.
10. **We will work towards a collective vision based on scientific and local knowledge for a more sustainable future.**
11. **Following our system perspective, we aim to identify, test and scale combinations of agroecological practices, rather than AEPs in isolation.**
12. *We will involve regional and national actors to improve the legitimacy of our approach and ensure relevant future results.*
13. *We represent different stakeholder groups and make sure we regularly consult with them.*
14. We are committed to mobilizing the stakeholder groups that we represent for the purpose of discussing and implementing agroecological practices.
15. **We will take into consideration the wide diversity of farm households when discussing agroecological practices and an agroecological transition.**
16. We are willing to inititate and self-organize activities.
17. We actively seek to empower ourselves and the stakeholder groups we represent
18. *We are committed to continue throughout and until after the NATAE project cycle.*
19. *We adhere to the NATAE ethical guidelines for doing research.*
20. ...

[6] During the discussions, the idea of challenging power was actually considered by multiple participants as inappropriate for the NATAE LL. Adaptation/rephrasing seems definitely necessary for this “practice” if it were to be included in the final list for the code of conduct.

Appendix D. Improved consent forms

Improved consent forms are provided for groups and individuals. Improved consent forms are provided in English, French and Arabic on the NATAE NextCloud. In this appendix the content of the English version is presented (obviously, the lay-out of these forms is better in the original forms).

Funded by the European Union

NATAE North African Transition to AgroEcology

Multi-Actor Living Labs

Group Consent form and Collective Privacy Notice for the Provision of data

Instructions
This document should be read out loud, clearly and intelligibly, by any person representing the NATAE project to a group participating in an activity that requires the collection of personal data/information collectively under the framework of the project, such as in the case of focus groups for example.

Text of the collective consent form
This document gives you information on our project. It explains the reasons and importance of your participation and how we will use your answers.

Name of project: NATAE (Fostering agroecology transition in North Africa through multi-actor evaluation and networking), funded by the European Commission and lasts from 2022 to 2026. NATAE gathers 22 research and development partners from 14 countries from North Africa and Europe and is coordinated by the Mediterranean Agronomic Institute of Montpellier CIHEAM IAMM, France.

Description of the project: This research project aims to contribute to achieving better living conditions by improving our collective knowledge of the different types of agriculture and their associated practices in a way that can (1) allow adaptation to climate change and preservation of the natural resources, (2) foster food security and nutrition; (3) valorize local society and culture (4) lead to better economic results and collective benefits. The project relies on a participatory approach in 6 North African countries (Egypt, Tunisia, Algeria, Morocco, Mauritania, and Libya).
Your participation will help us to clearly comprehend local challenges and needs of the different actors including those of the agri-food value chains and to share the different points of views, ideas and experiences related to farm and value chain practices that are promising locally and for the common future of the region.

Collective consent

1 / The collection of consent linked to your **audio or video/photo voice** will be carried out directly on the attendance sheet for this event, specifying the purposes of processing. If you do not wish your photo/video/audio recordings to be used, please inform the NATAE project representative present at your event.

2 / Your personal data and your answers will be anonymized and no access to other than the project partners will be possible (within or outside of Europe). Once the NATAE project is completed, your anonymized data might be reused as input for the benefit of future research programs.
In the case of study research being conducted by Master students, your data will not be shared with any parties outside the project's consortium partners. We might only share the final written research report to promote the results from our project.

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According to the regulations of the European Union, you are free to retract your answers from the project database, or your consent to their processing, or your personal information in the case where processing has been initiated with the halting of future treatment, and ask us any question or exercise any granted right concerning your data, at any given moment throughout the project implementation at the following address.

Data controller: (*name, address & contact information of the institution responsible, to be communicated with the participants*) _____

Do you agree with your participation in the NATAE project and the processing of your data as mentioned above?

If you do not agree with the collection of your data and their processing, you may leave the event or at least inform us before the recording is started.

If your questions have not been resolved through your requests or your discussions with our teams or if you feel your rights have not been respected, you are entitled to file a complaint with Project Coordinator by email at contact@natae-agroecology.eu or by phone +33(0) 4 67 04 60 26; more information on the project available at: https://www.natae-agroecology.eu/

Date: _____

First/ Last Name of participant	**Response** "Y" = Yes, I agree "N" = No, I do not agree	**First/ Last Name of participant**	**Response** "Y" = Yes, I agree "N" = No, I do not agree

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I hereby certify that I have read, clearly and intelligibly the content of this consent form to the participants being interviewed and I have answered all questions they might have asked prior to the selection of their above responses.

Name of the NATAE representative filling the form: _____

Signature of person filling the form: _____

List of NATAE consortium partners:
Mediterranean Agronomic Institute of Montpellier (France), National Agronomic Institute of Tunisia (Tunisia), University of Thessaly (Greece), Centre D'Actions Et De Realisations Internationales (France), Centro Internazionale Di Altistudi Agronomici Mediterranei (Italy), Leibniz-Zentrum Fuer Agrarlandschaftsforschung (Zalf) E.V. (Germany), Wageningen University (The Netherlands), Mediterranean Agronomic Institute of Chania (Greece), Institut Agronomique Et Veterinaire Hassan II (Morocco), Sociedade Portuguesa de Inovação - Consultadoria Empresarial e Fomento da Inovação, S.A. (Portugal), Ecole Nationale D'agriculture De Meknes (Morocco), Groupe De Recherche Et De Realisations Pour Le Developpement Rural (France, Mauritania), Centre De Recherche En Economie Appliquee Pour Le Developpement (Algeria), Observatoire du Sahara et du Sahel (Tunisia), Ecole Nationale Superieure Agronomique (Algeria), Reseau Des Initiatives Agro Ecologiques Au Maroc (Morocco), Sebha University (Libya), International Centre For Agricultural Research In The Dry Areas (Lebanon, Morocco), Association Tenmiya (Mauritania), University of Pretoria (South Africa), Institut National Des Grandes Cultures (Tunisia), and International Union for Conservation of Nature (Switzerland).

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NATAE
Fostering agroecology transition in North Africa through multi-actor, evaluation, and networking
Name & Date of event
Organiser of the event

NATAE North African transition to Agroecology

Attendance sheet and photo/video/audio consent

Instructions
Prior to launching of the event, the following notice should be read out loud, clearly and intelligibly, by any person representing the NATAE project to the group participating in the event to ensure that the attendees' consent to the recording of the event via video, audio and/or photo.

Text of the photo/video/audio oral consent

We would like to inform you that the event you are attending today will be photographed and/or recorded via video or audio. We will be using this content for the purposes of communication and promotion of the NATAE Project activities, events, results and outputs. The use of the content could include paper format (such as leaflets, newsletter, posters, reports, etc.) and digital/online format including websites, social networks, and other multimedia supports produced by the NATAE Project and its partners. These data will be stored by the organiser of the event, the Project Coordinator, the Mediterranean Agronomic Institute of Montpellier CIHEAM IAMM and/or by the project's communication partner: Sociedade Portuguesa de Inovação SPI.

Do you agree with what was mentioned above?

Any attendee not willing to agree with what was mentioned above is kindly asked to state their full name for record.

I hereby certify that I have read, clearly and intelligibly the content of this consent form to the participants and I have answered all questions they might have asked, and I have registered the following names of attendees not accepting the above statement:

Date: _____

Name of person filling the form: _____

Signature of person filling the form: _____

Registered names not accepting the above statement: _____
_____
_____
_____

Attendance sheet (all participants)

Line No.	First name	Last name	Title / organisation	Signature Morning session	Signature afternoon session (if any)
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					

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NATAE North African Transition to AgroEcology

Multi-Actor Living Labs – Consent Form and Information Sheet for Individuals

Instructions
This document should be read out loud, clearly and intelligibly, by any person representing the NATAE project to a participant in an activity that requires the collection of personal data/information under the framework of the project.

Text of the consent form

This document gives you information on our project. It explains the reasons and importance of your participation and how we will use your answers.

Name of project: NATAE (Fostering agroecology transition in North Africa through multi-actor evaluation and networking), funded by the European Commission and lasts from 2022 to 2026. NATAE gathers 22 research and development partners from 14 countries from North Africa and Europe and is coordinated by the Mediterranean Agronomic Institute of Montpellier CIHEAM IAMM, France.

Description of the project: This research project aims to contribute to achieving better living conditions by improving our collective knowledge of the different types of agriculture and their associated practices in a way that can (1) allow adaptation to climate change and preservation of the natural resources, (2) foster food security and nutrition; (3) valorize local society and culture (4) lead to better economic results and collective benefits. The project relies on a participatory approach in 6 North African countries (Egypt, Tunisia, Algeria, Morocco, Mauritania, and Libya).

Your participation will help us to clearly comprehend local challenges and needs of the different actors including those of the agri-food value chains and to share the different points of views, ideas and experiences related to farm and value chain practices that are promising locally and for the common future of the region.

Your consent

1 / We would like to inform you that the event you are participating in today could be photographed and/or recorded via video or audio for three main uses: production of knowledge (research), training content (pedagogy) and advocacy though NATAE project activities. The uses of the content could include paper format (such as leaflets, newsletter, posters, reports, etc.) and digital/online format including: websites, social networks. No commercial use will be ever made of this material.

☐ **Yes, I agree** ☐ **No, I do not agree**

2 / Your personal data and your answers will be anonymized and no access to other than the project partners will be possible (within or outside of Europe). Once the NATAE project is completed, your anonymized data might be reused as input for the benefit of future research programs.
In the case of study research being conducted by Master students, your data will not be shared with any parties outside the project's consortium partners. We might only share the final written research report to promote the results from our project.
According to the regulations of the European Union, you are free to retract your answers from

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the project database, or your consent to their processing, or your personal information in the case where processing has been initiated with the halting of future treatment, and ask us any question or exercise any granted right concerning your data, at any given moment throughout the project implementation at the following address.

Data controller: (*name, address & contact information of the institution responsible, to be communicated with the participant)*_____

Do you agree with your participation in the NATAE project and the processing of your data as mentioned above?

Tick the response

☐ **Yes, I agree** ☐ **No, I do not agree**

Name of participant *(interviewee):* _____

Date: _____

If you do not agree with the collection of your data and their processing, you may leave the event or at least inform us before the recording is started.

In the case of a written consent (*)

Signature of participant: _____

In the case of an oral consent (*)

I hereby certify that I have read, clearly and intelligibly the content of this consent form to the participant being interviewed and I have answered all questions they might have asked prior to the selection of their above response.

Name of person filling the form: _____

Signature of person filling the form: _____

(*) Choose one of the two options, signature of the participant OR signature of the interviewer AND cross out the choice that does not correspond.

If your questions have not been resolved through your requests or your discussions with our teams or if you feel your rights have not been respected, you are entitled to file a complaint with Project Coordinator by email at contact@natae-agroecology.eu or by phone +33(0) 4 67 04 60 26; more information on the project available at: https://www.natae-agroecology.eu/

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Appendix E. Ice-breaker

The ice-breaker proposed for the launch of the Living Labs is just one example among many. Feel free to deviate according to the needs of your Living Lab.

The ice-breaker should make LL representative board members feel comfortable with one another. Participation should therefore not be mandatory.

Example of finding 10 things in common (you may adapt the number to 5 to save time):

“Split everyone into pairs and hand each pair a piece of paper. Each pair is responsible for finding 10 things they have in common with one another. Remember to tell everyone easy cop-outs aren't allowed, like "we both have hands". Once they find 10 things they have in common, they share their discoveries with the group.

Splitting the group into pairs will allow your teams to disperse, so that not everyone is gathered together and people are able to take some physicaldistance more easily. The point of this icebreaker is to help direct conversations and to find some similarities between you and your partner. You can repeat this a few times to have people chat with someone new.”

Source: https://risepeople.com/blog/team-building-icebreakers/#:~:text=10%20things%20in%20common,%22we%20both%20have%20hands%22.

Appendix F. Photo-voice

Photovoice is a participatory method in which local actors share their perspectives with the use of own photographs taken in the territory under study (Castleden et al., 2008; Wang and Burris, 1997). The pictures are used in workshops as descriptive tools to foster group discussions and reflections. The photovoice method can help to balance power, create ownership, foster trust and build capacity (Castleden et al., 2008). It can be applied for the identification of a community's needs and resources but also when it comes to evaluate the community process itself (Castleden et al., 2008; Wang and Burris, 1997).

During the preparation for the launch of the Living Labs representative board members will only use some elements of the photovoice method. It will provide a preliminary glimpse of the perspectives of the different LL representative board members. For instance, related to how they frame the issues in the LL and what role they play in the LL (see also Figure 3 in the main text). Asking participants to present themselves, their activities in the food system and motivation to participate in the LL representative board through self-made pictures, the groups knowledge on different roles and perspectives in the system at stake can be enriched. Insights into relevant components of the food system may be gained, which may otherwise be overlooked (e.g. during surveys, territorial diagnosis). Relevant issues faced in the system may also be identified, acting as a starting point for the participatory co-design of the agroecological transition. In any case it is a creative activity resulting in an immediate creative output for participants - the picture itself, potentially combined with the metaphoric OASIS – scheme of the system at stake. This increases participant's ownership of the project objectives, process and results.

Instructions:

- Communicate before the first LL representative board meeting:
    - That they are expected to bring their own photo that helps presenting them during the first LL representative board meeting. Alternatively, they could bring any photo or even a drawing. It is up to the LL-facilitator to decide whether this should be in printed and/or digital form.
    - Participants are asked to verbally present and reflect the content of the images. The following questions can support this process:
        - What system elements are visible in the picture? (Natural resources, networks, institutions, stakeholders)
        - Whose stake is most visible in the picture? Whose stake is absent in the picture?
        - What constraints and possibilities regarding agroecology are presented in the picture?
        - Does the picture mostly help to frame the problems in the area or rather puts forward different solutions?
    - When taking pictures, LL representative board members should ask politely for consent from people if they would like to include them in their picture.
    - The images can then be used to enrich the metaphorical representation of the food system in the OASIS scheme.

Appendix G. Oasis/iceberg model systems thinking workshop

This 120-minute workshop is largely based on the “iceberg model” workshop from the Wayfinder approach. In fact, most of the text below is copy-pasted from https://wayfinder.earth/wp-content/uploads/2018/09/activity-sheet_work-card-3-updated-1.pdf. The workshop will be held in 2 blocks of 60 minutes.

As icebergs may not be the best metaphor in a North African context, NATAE LL leaders and facilitators will work with the metaphor of an oasis (Figure A8). In an oasis, the surface water and adjacent land is visible. In the metaphor, this visible part can be associated with the events to which LL actors (need to) react (Figure A8). When digging deeper, we arrive at the aquifers that nourish the oasis. These relate to the processes to which we can anticipate, structures that might need a re-design and mental models that could be transformed (Figure A8).

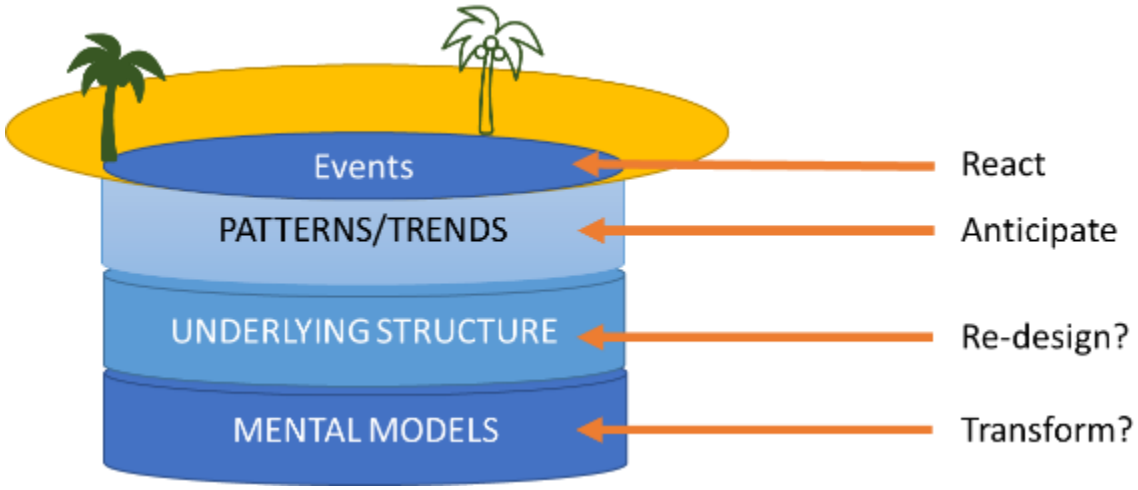

Figure A8. The oasis model

The oasis model systems thinking workshop is a fairly robust process, i.e. not many things can go wrong. But it is easy to get bogged down in detail. So, keep the discussions at a high level, as it is a metaphor to aid learning and insight, not an analytical tool. You could use an alternative metaphor, following the same logic that the top part may be most visible, but what is happening underneath is what really matters.

Purpose of activity

The oasis model is a useful learning device (heuristic) to support discussions with your team and with stakeholders about the need for a complexity-based approach to addressing sustainability problems. Creating an oasis model of your own system helps you internalize the idea that to create change in complex systems you need to look beyond surface events, and strive for a wholistic view of the underlying system dynamics. During subsequent steps in NATAE, people’s attention can be drawn back to the oasis model, reflecting on whether they are thinking ‘above or below’ the surface about an issue?

Resources needed

Required skills: a general understanding of complexity and system dynamics

Time: 120 minutes for explanation (5 min per step) and discussion (10-15 min per step)

Materials: white board or poster paper and markers, or powerpoint

Useful links: https://graid.earth/wp-content/uploads/2017/10/GRAID-Complexity-Briefing.pdf

How to do it:

Draw the oasis model on e.g. a whiteboard and jointly discuss your system. Fill in the detail as you go, so the participants see the 'story' evolve. Make the process a discussion rather than a 'lecture', drawing examples from the participants, checking if they understand the picture that is emerging.

Step 1

Draw the outline of the surface of the oasis, i.e. what is visible when just walking around. In this most visible part of the system there are the things that we see around us every day, including the shocks that often dominate our thinking about the system. Things like droughts, floods, hurricanes, famine, and conflict are obvious, but it could also be policy, trade decisions, pollution events, etc. Ask the participants for examples for shocks or major events that have impacted the system. It is important to not downplay the importance of these events in impacting the wellbeing of people. However, the discussion needs to move to the fact that these events can dominate our thinking, locking us in to short-term, reactive interventions. To manage systems in the long term and shape change, we need to look at the underlying dynamics creating these events.

Step 2

Next, draw the aquifer under the oasis. This is not visible most of the time. Stress however that to really understand and work with systems, we need to work 'below the surface'; that is where the real potential for change lays. The role of NATAE is to help explore and understand what is happening 'below the surface'. Under the surface, talk first about patterns, processes and functions. For example, you may have identified drought and famine being 'above the surface'. But if we step back from any particular event, there may be a recognizable pattern. Climate extremes are driven by global weather patterns. In the global south, weather cycles such as the Southern Oscillation give rise to particular repeated patterns of shocks, loss of crops and livestock and consequently famine in the years immediately after the shock. Try to draw out patterns, processes and functions related to your surface events.

Step 3

Now move deeper, focusing on systemic structures. These are the major structuring or ordering parts of the system. Think here about the physical structure of the landscape. For example, living at the top of a river valley versus at the bottom, or inland versus coast, is important for determining what types of shocks and the related patterns and processes may impact a system. Think also about the 'rules' that organise and shape the system, things like policy, property rights (how resources are allocated, owned and shared), the structure of the economy, judicial and law systems, cultural practices, norms and traditions.

Step 4

Finally, draw in the deepest layer of the aquifer, i.e. the paradigms, world views and values. These form the foundation for everything above, how we think about the system and the way we impose our values and worldviews on the world. So for example, how we think about the allocation and access to resources for people will fundamentally determine the structure of the system over time.

Step 5

Having drawn the whole oasis system, it is now time to illustrate the link between the layers under and above the surface. Try to draw out how patterns, processes, functions, structures, and values influence the surface event. For example, creating infrastructure to provide access to water will change the structure of the landscape, shifting water flows across the landscape. That in turn may render the community and the landscape vulnerable to droughts, flooding and possibly the spread of aquatic pests.

Step 6

In the closing discussion, reflect on where people are focusing their efforts and attention currently? Above the surface being reactive, or below the water being more proactive? Which layers have the most potential for creating change?

Researchers will photograph the completed oasis-model and write a one-page report that synthesizes the discussions. This report will be shared with the LL representative board and with the NATAE consortium. The oasis model can be used as a point of reference and can be updated each time the LL representative board members meet.

Appendix H. Organizing the transect walk

Transect walks are a great way to get a first-hand experience of the field and stakeholder perspectives. The emphasis lies on describing the agricultural system in place, based on what can be observed in the field. The main purpose of the transect walk is to get a common understanding of the agricultural situation in the area with its practices, issues and opportunities. As this transect walk is part of the launch of the LL, all participants are invited to participate.

The organizational steps for the transect walks are largely based on the European network of Living Labs (https://unalab.enoll.org/transect-walk/), complemented with farming system specific features from the farming system analyses course provided by WU.

- Step 1: LL representative board members, in particular farmers, determine the transect walk with 3-5 stopping points. It is essential that the transect walk shows the diversity in current agriculture, e.g. regarding soils, crops, livestock, farm households. For a 1.5 hour transect walk, a distance of up to 2 km is feasible. A map showing the transect route will be printed.
- Step 2: Researchers and LL representative board members document the information (< 2-minutes per point) to be shared at each stopping point. Ideally, the transect walk will be guided by LL representative board members, preferably farmers. This is a first step towards a self-organized LL and improves the visibility of LL representative board members. Moreover, it will provide insights in how stakeholders perceive their own area. Ideally, the transect walk should first be tried out by LL representative board members and researchers before conducting the walk with all stakeholders during the launch of the LL.
- Step 3: While walking, researchers and LL representative board members discuss with local stakeholders about what they observe. One LL representative board member is guiding the transect walk. At each stopping point, he/she gives the floor to a LL representative board member that will present his/her observations at that point in a 2-minute pitch. After that, this LL representative board member invites the other stakeholders to share what they observe.
- Step 4: After the transect walk, all participants will be provided with three post-it to write down the three most important things they observed during the transect walk regarding agroecological practices (opportunities, barriers, enabling conditions, etc.). Researchers will group post-it with similar statements and organize them in a diagram during the meeting and provide a preliminary synthesis that will be discussed with the participating stakeholders. Arrows between groups of statements can be drawn to visualize relations between them. The diagram with post-its will be photographed and participants should be able to have a closer look after the meeting has ended. Also the printed map of the transect walk should be presented, including the points where stops were made. This will help stakeholders to remind the things they have observed in the field.
- Step 5: After the meeting, researchers will finalize the diagram and report back to the participants and the NATAE consortium. Researchers will compare the outcome of the transect walk with the outcome of the oasis model exercise.

Ideally, the transect walk will be located close to the venue where the launch of the LL is held.

In case of large numbers of participants, a megaphone may be required. When the number of participants is over 20, it is recommended to form two groups.

Based on weather conditions (e.g. heat), the transect walk should be planned sooner or later.

The transect walk may be re-used at later stages, e.g. during experimentation (T4.5) or cross-visits (T5.8).

NATAE

North African Transition to AgroEcology

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