



MOVING
MOUNTAIN VALORIZATION THROUGH
INTERCONNECTEDNESS AND GREEN GROWTH

MOVING Conceptual Framework

FINAL

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1. Introduction

The EU Horizon 2020 Framework, and more particularly the work programme of food security, sustainable agriculture and forestry, marine, maritime, and inland water research and the bioeconomy, developed a call for proposals under the name of Rural Renaissance. Within this call there was a theme on “Building resilient mountain value chains delivering private and public goods” which ultimately led to the MOVING (Mountain Valorization through Interconnectedness and Green Growth) project.

The ambition behind the Rural Renaissance call was interpreted by MOVING partners as follows.

1. Rurality is a fundamental dimension of the future of Europe for reasons like, to name some, landscape and cultural heritage preservation; food and other primary products provision, ecosystem services. At the same time, mountain areas are a cradle of diverse forms of rurality, also because they are often less exposed to mainstream market forces and their specificities make economic activity less standardizable.
2. Value chains based on the specificities of (rural) mountain resources and landscapes can thus develop in these areas, delivering a range of outcomes. However, they can also create dependency of local systems and communities on a range of internal and external factors. The related level of vulnerability depends on the capacity of local actors and governance to retain a certain control on local resources, networks and flows.
3. Thus, a rural renaissance cannot be pursued without supporting with adequate knowledge generation and policy measures targeting those value chains that can strengthen sustainable and resilient mountain socio-ecological systems.

Hinging on these reflections, one of the main aims of the Conceptual and Analytical Framework (CAF) is to link the value chain literature to the socio-ecological systems (SESSs) approaches (Mc Ginnis and Ostrom, 2014). A central assumption of MOVING, refined and validated throughout the project, was that **value chains** connect different **socio-ecological systems**, whose sustainability, vulnerability, and resilience are influenced by value chains’ practices and governance systems. The reflection on the relevance of socio-economic and environmental interactions between different SESSs, placed even in distant geographical locations, has led to use the concept of “telecoupling”, as a frame that hinges on concepts such as teleconnection and globalization to take into consideration and improve the understanding of distant interaction (Liu et al. 2013).

Following these reasoning, the aim of MOVING was *“to build capacities and co-develop - in a bottom-up participatory process with value chain actors, stakeholders and policy makers - relevant policy frameworks across Europe for the establishment of new or upgraded/upscaled value chains that contribute to resilience and sustainability of mountain areas”*.

To achieve this goal, MOVING developed, tested and validated *“a new collaborative methodology based on science-society-policy interfaces to assess multi-scale changing scenarios and define*

new demand-side policy options to overcome expected threads and enhance new opportunities for the resilience and sustainable development of mountain areas”.

The CAF reflected the multi-scale and multi-stakeholder vision highlighted above, as well as the ambition to combine analytical approaches like mountain value chains, socio-ecological-systems and telecoupling to account for the complex interplay of these diverse elements.

The initial observation, which was validated and refined throughout the project, was that mountain value chains are subjected to impactful external forces. This is because they are linked from the technological, economic, and environmental perspectives to extra-local actors and dynamics which can be beneficial (even necessary) for the functioning of the value chain but can also weaken the capability of local actors to retain any control on the value chains' processes and to respond effectively. The self-containment of flows and functions is often limited, while networks and governance patterns are changing, sometimes in an unpredictable and rapid way. Thus, investigating the stability and vitality of the European mountain areas value chains and territories requires unpacking the relation between mountain SESs and extra-local, sometimes global, value chains, in a dynamic perspective. Concepts like “**practices**” and “**assemblages**”, described in detail in the next sections, have been identified as key in the CAF to account for this complexity and this dynamic view.

The aim of the initial CAF was also to support, through structuring the research outcomes, the design and implementation of local-based policies and solutions that can balance different ecological, social and economic priorities (Moretti et al. 2023). These solutions can be better identified when the boundaries of the analysed SESs are determined by the actual material and immaterial flows, even at distance, rather than by spatial or institutional borders.

This led to the identification of a set of key research questions that guided the value chains analysis in MOVING and were at the same time refined in the course of the work.

- Which are the practices that shape and support the functioning of local or spatially extended value chains contributing to sustainable and resilient SES in mountain areas?
- What are the conditions enabling value generation and its retainment at the local level for mountain regions?
- What are the focal points for designing/developing mountain value chains contributing to sustainable and resilient SES?
- Which governance arrangements for local communities and value chains are more adequate to influence actors' practices in the perspective of sustainability and resilience for mountain SES?

These questions also provide a frame for the definition of the more detailed analytical questions listed in Section 4.

This final empirically grounded CAF is one of the main outcomes of the project, as it refines the initial document in the light of the research work carried out throughout MOVING, and of the reflections developed among the partners as well as suggested by the EC reviewers. The definition of a shared language and common approach among consortium members

characterised by different background and expertise, was an aim of the initial framework, to be then validated and refined in the light of research outcomes and related joint reflections.

The MOVING CAF has been conceived as a living document. The initial version of the CAF was based on a review of the relevant scientific literature, putting together different literature bodies (Moretti et al., 2021b). A sequence of feedback events with the consortium members allowed a first refinement. During the project, partners had the opportunity to test the validity of the framework, to provide examples that validate or that limit the validity of the assumptions and of the statements and contribute to its refinement.

This document proceeds as follows, based on the structure of the initial CAF (Moretti et al., 2021b). In Chapter 2 the key concepts upon which the CAF is developed are introduced and described through the perspective of MOVING: “value chains”, “socio-ecological systems” and “vulnerability and resilience”. Chapter 3 provides the logical frame in which mountain value chains’ contribution to sustainability and resilience of socio-ecological systems can be understood and explored based on Ostrom (2009) and McGinnis and Ostrom (2014), followed by a series of eleven statements connecting the main elements of the frame with each other in a consistent reasoning. Telecoupling is finally described, as a concept capable to account for the interaction between different SESs. A fourth section identifying implications for empirical analysis, as envisaged at the start of the project and then validated through the work carried out, follows. This section also contains the set of questions which guided the analysis connecting the key conceptual and analytical concepts and providing an operationalisation of the theoretical concepts. In the annex, a ‘glossary’ of the most relevant concepts is provided to make the report a tool for future reference.

2. Value chains and Socio-Ecological Systems’ vulnerability and resilience

In this section some key concepts of the framework are introduced and described, in general terms and with reference to mountain areas and to the specific MOVING perspective. Value chains and SESs are the main concepts MOVING relies upon to adopt a systemic view in which single elements and interactions are linked and seen together in their dynamic. Among the main outcomes of these interactions are the consequences in terms of vulnerability and resilience, that are also addressed in the last paragraphs of this section.

2.1. Value and Value Chains

Value chain is an expression generally attributed to Porter (1985), that has spread in several cultural contexts concerning a “meso” level of investigation, i.e. an intermediate level between firm and macro level (i.e. economic system). The concept is used to address several questions: “vertical” links among firms, forms of coordination among firms other than market and hierarchy, vertical trade among areas of the world (trading tasks, offshoring, and outsourcing, etc.).

In literature, several definitions can be considered precursors or evolutions of the value chain concept, or even different angles from which the same or similar objects can be conceptualised:

- **Filière (1960s)**, the flow of physical inputs and services in the production of a final product (filière of production, i.e., from input to output, or filière of product i.e. from output to input) (Lauret, 1983; Malassis, 1973);
- **Commodity Chain (1970s)**, similar, derived by dependence theories (Wallerstein, 1974);
- **Supply Chain (1980s)**, similar, more in a logistic management sense (Hugos, 2003);
- **Global Commodity Chain (1990s)**, describing the shift in the organization of global production toward external networks (the so called “outsourcing wave”) (Gereffi & Korzeniewicz, 1994);
- **Global Value Chains (GVC 2000s)**, like the previous replacing commodity (that basically means raw undifferentiated material) with value intended as “value added” (Sturgeon, 2008);
- **Netchains (2001)**, Integrating supply chain and network analyses (Lazzarini et al., 2001).

Nowadays, value chain represents a key concept in management disciplines (strategic or operational management of chains aimed at obtaining competitive advantages, etc.) but also in development theory and practice (structural or geographical changes, development policies, etc.). Considering this diversity of backgrounds, it is impossible to provide a unique definition of value chain. Two definitions are proposed below: the first taken from the managerial context (more precisely referred to “supply chain”), and the second considered in a development approach:

1) (management perspective) *“the network of organizations that are involved, through upstream and downstream linkages, in the different processes and activities that produce value in the form of products and services in the hands of the ultimate consumer”* (Christopher & Peck, 2004);

2) (development perspective) *“series of steps from the initial production to the final consumption and the actors involved at each stage. The activities/operations of these agents are geographically localised. They identify products, financial and information flows between actors and areas”* (European Commission, 2018).

Together, the two definitions include the most relevant characteristics of a value chain. Basic units of a value chain are actors (not only firms but organizations in general) and activities (steps). As important as the units are the linkages among them (inputs, outputs, financial flows, information, etc.) that “transform” those units in the object (the value chain) of the analysis. The main value chain purpose is to generate value for (and from) the final consumer. This is the characteristic “vertical” dimension of the value chain, that cannot be intended as a single direct path, but as the “tangle of roads” that flow from the initial resources and productions to final users or, conversely, from the latter to the former (from downstream to upstream). Since MOVING focuses on specific geographical areas where actors and resources are localised, the analysis first focuses on local resources and productions, and then down the chain until the final use of the products.

Looking at how value chains are conceptualised in MOVING, it is important to focus the attention to the meaning of “value”. We look at value in a broad sense, covering not only economic benefit

for producers and consumers, but also at the range of possible social and environmental benefits that are deemed worth to be delivered. The economic value is central, as it is often the catalyst upon which value chains are created and may develop. Nevertheless, the other dimensions are important as well, in themselves for the societal well-being, and because they strongly contribute to the creation of economic value when they are included into a “value proposition” and in a branding strategy (as for the protected denomination of origin - PDO), and in other public or private standards (e.g., the EU organic and mountain-reserved labels, the fair-trade labels).

We do not enter here the long-standing debate on the origin of value and on its definitions. For our purpose, it is anyway important to consider two different concepts of value. On the one side an “objective” definition, rooted in classical political economy, linked to the labour and resources (capitals, time) employed to produce a good or a service. On the other, a rather “subjective” definition, rooted in neoclassical economic thinking, based on the utility of such goods or service, for final use or for market (monetary or barter) exchange. The first definition helps the consideration for what a “fair price” for an item should be; the latter refers to the actual possibility to have that value acknowledged and gained.

If value is seen, as indicated in the Glossary, as the perceived benefit that each of the components of the supply chain gets from the participation to its activities (while keeping distinct value generation from value distribution), we get close to the “subjective” definition which deals the cultural and behavioural side of how things are valued by people (Fernandes 2012). However, even in this perspective, the market is not the only judge of value: many of the goods, and especially services, provided by the selected value chains are not at all, or not fully, marketable as they have the characteristics of commons, or for an under-appreciation of future benefits. This gives a role to the political and regulatory sphere in the appreciation of this value and for the remuneration for those who created it, and it leads to a positive answer to the question evoked by Köhler in 1976 and then echoed by de Monticelli: *“is there a place for values in a world of facts?”* (Köhler 1976, de Monticelli 2019).

This wide understanding of the concept of value influenced the identification of the value chains to be analysed in MOVING. As explained in Moretti et al., (2021a) and recalled in section 4 of this CAF, value chains have been selected not necessarily in the light of their contribution to employment or economic value, but rather with respect to their capacity to valorise (and to add value to) local natural (and cultural) resources.

Besides, as accounted for in Section 3, the concept of value in its broad sense is also at the foundation of the set of outcomes/performances of SES identified in the comparative analysis in WP5, that refined the initial set of outcomes.

2.2. Mountain areas and Socio-Ecological Systems

In the above-mentioned descriptions of the value chains from different perspectives, the concepts of production and product were often mentioned. Indeed, products (and services) are the cornerstone around which value chains are developed. We deal here with “mountain” products

and services, i.e. products and services delivered by mountain value chains. As argued in the Introduction, mountain value chains are those based on the specificity of (rural) mountain resources and landscapes. In other words, they are identified based on the geographical location of the key resources (including knowledge) on which they rely upon and on the degree of control over the value chain development. In this perspective, mountain products and services are those around which a value chain is structured in a mountain area.

Before introducing the concept of a spatially located SES, this leads to consider what are the characters of a “mountain area” for MOVING. Looking at what was developed in Moretti et al., (2021a), the MOVING project started from acknowledging that mountain areas are very specific but also highly differentiated contexts. It is therefore hard to group them according to a single character, be it a handicap, an advantage or another specificity. This was reflected in the diversified feedback received by different stakeholders when asked to identify their area in terms of backwardness, remoteness and other elements. However, some geomorphological characteristics (e.g., high altitude, steepness, remoteness) and the consequent exposure to climate change, extreme events, and socio-economic disturbances can be identified as frequent, yet not necessarily generalised, markers of mountain areas. The reflections developed within MOVING also led to consider mountain areas are a cradle of diverse ecosystems and forms of rurality, not least because many of them, due to their geographical location and morphology, are less exposed to mainstream economic forces and less standardizable (though this may be not true for all the mountain areas and for every value chain).

These general reflections on mountain areas were the base upon which the methodology for the identification of the most pertinent level for the analysis of the value chains and their contexts was developed. As explained in González-Moreno et al., (2022), starting from the 23 Mountain Reference Regions (MRR), the studies were then focused on smaller areas defined as Mountain Reference Landscapes (MRL), which were seen as representative of the value chain under analysis. Practical and analytical elements, like the link with administrative territorial units and the possibility to identify and connect relevant local stakeholders, as well as the spatial continuity, have also been considered in the definition of MRLs.

Moving to the concept of [Socio-Ecological System](#) (SES) - also termed coupled human–environment systems (Turner, Matson, et al., 2003) or coupled human and natural systems (Liu et al., 2007) – *they are defined as complex, interdependent and linked systems of people and nature which are nested across scales* (Berkes & Folke, 1998). They are complex systems comprised of nested components (subsystems) which are related with each other at different levels (McGinnis & Ostrom, 2014; Ostrom, 2009). The SES concept reflects the notion that people (*the social system*) are part of ecosystems (*the ecological system*) and shape them according to sets of norms and rules (Ostrom, 1990) and are, at the same time, dependent on the capacity of ecosystems to provide services for human wellbeing and societal development such as supply of food, fibre, energy, and drinking water.

SESs are structured in different subsystems which are independent from each other in the accomplishment of several functions but eventually affect each other's performance. In a SES,

the resource units (RU), the resource system (RS), the governance system (GS) and the users (U) deliver outcomes (O) as result of interactions within them and with the social, economic, and political settings (PS) and the related ecosystems (ECO) (McGinnis & Ostrom, 2014; Ostrom, 2007; Ostrom, 2009).

To clarify the distinction between RS and RU, Ostrom (2009) mentions protected areas encompassing a specified territory as an example of the former, and trees (individual trees as well as all the trees in a defined location), other plants, types of wildlife and water flows as examples of the latter. Similarly, looking at immaterial resource, a cultural heritage can be seen as a RS, whereas a specific production or processing technique or tool as a RU.

The concept of SES appeared in ecological anthropology in the 1960s and the 1970s, in the attempt to move beyond the Cartesian nature/culture, environment/society dichotomies through a focus on the relations between social and ecological systems. First, the cultural ecology approach pushed the focus toward the relationship between the environment and the cultural features and how change emerged out of the relationship over time; emphasising the role of human perception of the environment in shaping the relationships between nature and society (Steward, 1955). Ecological anthropology emerged as a logical extension aiming to achieve an exact specification of nature-society relationships by including both biological and social entities as well as the processes connecting them into a single analytical system, the ecosystem (Geertz, 1963). This system approach was taken up by political ecology which included the cultural and political activity within the analysis of ecosystems (Greenberg & Park, 1994). Within this domain, the SES concept was originally designed for application to common-pool resource management through the interlinked analysis of social and ecological systems (Berkes & Folke, 1998).

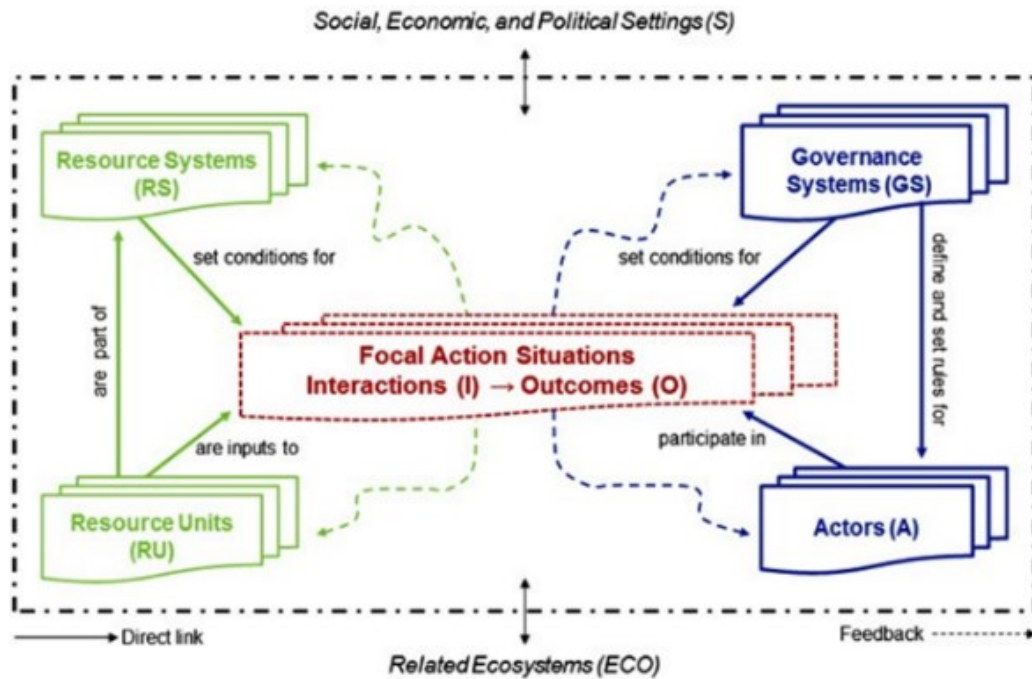


Figure 1: Socio-Ecological Systems. Source: McGinnis and Ostrom (2014)

To provide a common framework for analysing SESs, Ostrom (2009) proposed a conceptual model organized into a multitier hierarchy of variables which are relevant to understand the complex interactions within the different components and scales in a SES. The SES framework considers the ecological system as provider of services that increase human well-being (anthropocentric perspective), while considering the social system at both its micro and macro levels (actors and governance structures) as the driver of positive or negative transformation in the ecological system (Binder et al., 2013). The original framework proposed by Ostrom (2009) has been revised to extend its applicability to complex SESs in which multiple sets of actors, resource systems, and overlapping governance systems interact with each other (McGinnis & Ostrom, 2014), and adaptations of its structure have been proposed to include knowledge from natural sciences (Epstein et al., 2013) and local stakeholders (Delgado-Serrano & Ramos, 2015).

A last reflection regards the SESs and their capability to account for the specificities of mountain areas. In our view, the SES approach can be applied to mountain areas without need to change the key components, but with a careful and empirically grounded identification of the relevant outcomes, as shown in Section 3. As argued by Kelin et al. (2019) and confirmed by the MOVING research outputs, mountain SESs present specificities related to their biophysical, ecological and socio-cultural complexity and consequent economic specificities. Mountains are, for example, more prone to climate change and hazards (e.g., floods, landslides, fires) on the one side, and economic competition from lowlands and industrial plans on the other, while supplying essential ecosystem services from local to global scales. Connectivity issues are also peculiar, yet different

also from one mountain area to another. However, this does not imply the need for changing the main components of the SES as shown in Figure 1, but just for specifying them in the light of the mountain specificities.

2.3. Vulnerability and resilience

Vulnerability, adaptive capacity, and resilience are integrated concepts characterizing SESs (Lei et al., 2014). [Vulnerability](#) refers to the propensity of exposed elements such as human beings, their livelihoods and assets to suffer adverse effects when impacted by hazard events (Cardona et al., 2012), and it is defined as “the state of susceptibility to harm from exposure to stresses associated with environmental and social change and from the absence of capacity to adapt” (Adger, 2006). Building upon this definition, vulnerability can be conceptualized in term of three components: exposure to a hazard, susceptibility to it, and adaptive capacity to the shock or the stress generated by the hazard (Adger, 2006; Eakin & Luers, 2006). Vulnerability can be referred to a system and as a general condition of the people (or specific vulnerable groups or individuals), or to specific subsystems, for example supply chains, sectors, functions (Paloviita et al., 2016). Different subsystems or groups can have different degrees of vulnerability, and this is true also for its components: exposure, susceptibility, and adaptation capacity.

For example, households can have different exposure to food price volatility, in relation to the possibility of self-provisioning of food and to their dietary habits. As for exposure, the potential for and the magnitude of change within a physical system in response to external effects – susceptibility - can be unequally distributed among individuals and groups, depending on specific conditions (e.g., being young, elderly, pregnant), availability of suitable alternatives and the capability to manage different entitlements, cultural and personal habits, and individual perceptions. Depending on the criteria of the assessment, a system can be considered having a low degree of vulnerability even when some groups are heavily affected. Indeed, hazards are not mechanical events hitting equally or randomly (Brunori et al., 2020) and might affect some groups, or systems components and functions more than others. Considering together these two different aspects of vulnerability (of people and of systems) can help to explain why some groups are ultimately vulnerable (exposed, sensitive, adaptive) and some other are not, as well as to highlight interdependence between human and non-human subsystems (Brunori et al., 2020).

A further distinction between different approaches to vulnerability is suggested by O’Brien et al, (2007) and then discussed by Murphy et al. (2015), who distinguish between a more general “outcome vulnerability” and a “contextual vulnerability”, with the latter seen as highly contextualized within social, political, economic, and ecological contexts at multiple spatial and temporal scales, from local to global, from short to long term.

In a contextual vulnerability analysis, constraints, barriers, opportunities are identified in relation to these multiple levels, with attention to the social, cultural, and even psychological limits of each individual and each community in perceiving risks, assessing their own vulnerability (including the vulnerability of the resources they rely upon) and in acting and re-acting accordingly. Thus,

perceptions, beliefs, attitudes, and learning processes are determinants in this approach which underlines the vulnerability of the social and economic components of the SES.

In any approach to vulnerability analysis, factors affecting vulnerability can be divided into endogenous and exogenous to the system. Exogenous are the external factors to which the system is exposed, whereas endogenous factors relate to the system properties and characteristics, influencing its sensitivity and adaptive capacity, and thus the potential damage resulting from exposure (Brunori et al., 2020). Therefore, the effects of exogenous factors are mediated by some properties and characteristics, that influence the natural tendency of the system to experience negative outcomes in face of hazards, in other words to be vulnerable. Hazards can be of different nature: ecological, socio-cultural, economic, technological, and political (Adger et al., 2004; Preston & Stafford-Smith, 2009), and can have mild or severe consequences on the system (e.g., human beings, geographical area, ecosystem) due to its intrinsic conditions (sensitivity and adaptive capacity) which determine its propensity to be affected by a hazard (Birkmann, 2006; Cardona et al., 2012).

Fundamental linkages and interdependencies exist between the vulnerability and resilience approaches (Miller et al., 2010; Turner, Kasperson, et al., 2003) since both relate to the capacity of a system (or of people) to adapt in response to changing conditions (Engle, 2011). Indeed, Adger (2006) defined adaptive capacity as *“the ability of a system to evolve in order to accommodate environmental hazards or policy change and to expand the range of variability with which it can cope”*, while according to Holling (1973), Gunderson and Holling (2002), and Walker et al. (2004), the concept of [resilience](#) describes the degree to which the system is capable of self-organization, learning and adaptation, aiming at absorbing the changes without shifting to an altered state with different properties (Adger, 2006; Gunderson, 2003; Turner, Kasperson, et al., 2003). Moreover, the resilience concept, seen as the capacity of a SES to absorb or withstand perturbations such that the system remains within the same regime, essentially maintaining its structure and functions (Resilience Alliance, 2021) - implies the consideration of social and ecological systems as interdependent since social adaptability of a society must be coupled with the sustainability of the adaptation from an ecological perspective (Nelson et al., 2007).

The two concepts of adaptive capacity and resilience share a dynamic perspective on the relation between a system and its changing environment, as well as a consideration for the system's capability to change while preserving its capability to perform functions. The resilience perspective has a stronger emphasis on the reaction to sudden shocks, whereas adaptive capacity covers also a more gradual adaptation to changing conditions, given a certain degree of susceptibility to external drivers. It is also possible to include in the concept of adaptive capacity, the capacity to prepare the system for possible stressors or shocks, before they occur, which influence the capacity to react (with the vulnerability analysis jargon, the influence is on susceptibility).

For an analytical use of these concepts, it is important to “unpack the system”, to assess which elements of the system have the capacity/possibility to evolve, which elements are less exposed or susceptible, which ones are supposed to undertake radical change, or even to be reduced or dismantled and replaced by others performing similar functions.

The elements harvested during the project lead to some considerations on how the concepts of vulnerability and resilience can be adapted to the study of mountain value chains and mountain SESs.

As argued in the vulnerability analysis described in González-Moreno et al., (2022), the most critical factors influencing the vulnerability (or at least the perceived vulnerability) across the 23 selected areas (the analysis was conducted at the MRL level) were those related to climate-changes (witnessed for example in the cases of Corsican Chestnut Flour (France), Drome Valley Sheep Meat (France), and Central Apennines Alto-Molise Dairy (Italy)). Raising temperature and extreme weather events are often reinforcing each other in a vicious circle, as well as heavy rainfall and soil erosion (for example in the Sheep farmers from the region of Weiz (Austria)). This leads to consider that special and increasing attention are needed to this dimension when looking at vulnerability of mountain SESs and mountain value chains. This also influences the perception and the analysis of resilience when referred to mountain areas. Following what just argued regarding vulnerability, the system capacity to cope with changing conditions seems to be first based on the capability to react to climate-related factors.

However, other important vulnerability drivers have been identified in the stakeholders' perceptions, such as for instance the nature protection-based regulations of agricultural practices (Stara Planina High Nature Value Farming (Bulgaria)), abandonment and depopulation (Sumava – Cesky Les Cattle (Czechia), DO Douro Wine (Portugal), Serra da Estrela PDO Cheese (Portugal)), and the presence of wild animals (the Sheep farmers from the region of Weiz (Austria), Agroecological Knowledge (Hungary), Central Apennines Alto-Molise Dairy (Italy)). This is not the place for an extensive account of these elements, that are described in González-Moreno et al., (2022), but it is worth mentioning them to give an idea of how a vulnerability analysis of mountain areas can be framed.

As emerged by the comparative cluster analysis and described in Delgado-Serrano et al. (2024), another element that strongly influences SES's resilience is the trade-off between short-term value chain profitability on one side and other collective benefits generated within the value chain, such as the local control on local resources and the production of public goods.

Moreover, the cluster analysis conducted in WP5 identified another relation between mountain value chains and resilience (likely less peculiar of mountain contexts) pertaining the generation of trust among the actors in the value chain, the sharing of information and practices, as well the creation and strengthen of collective action institutions (Delgado-Serrano et al., 2024).

2.4. How are vulnerability and resilience linked to sustainability?

The concepts of vulnerability and resilience, as well as the related concept of adaptive capacity, are essential to explain the interrelated dynamics associated with the systemic approach to socio-ecological change and sustainability (Miller et al., 2010). In SESs, the normative concept of sustainability and the descriptive concept of resilience can be conceived as intertwined (Common

& Perrings, 1992; Levin et al., 1998; Perrings, 2006), or intertwined into relationships of different nature. In fact, the two concepts describe the ability of systems to adjust and maintain themselves in the face of change.

However, a resilient system is not necessarily a sustainable system. For example, the already cited cluster analysis (in particular on Cluster V “Value and quality products”), mentions those geographic indication-based quality schemes which do not set restrictions in the production methods to reduce environmental impacts. Such schemes could potentially allow more economic resilience, as less constraints are put on the producers for re-organising their business models, but at the expenses of sustainability (Delgado-Serrano et al., 2024).

Moreover, the resilience of a system can be obtained at the expenses of less sustainability in another. When we consider open systems - that is, systems where there is a flow of resources inside and outside the system - the resilience of a system (in our perspective, a mountain SES) can depend on the capacity to attract resources from the outside to face system hazards. But as resources come from the outside, this may mean that the resilience of a system may be obtained at the expense of the sustainability of other SESs. Derissen et al. (2011) suggested that resilience is neither sufficient for sustainability nor desirable by itself when the stable state is unsustainable. Considering this perspective, Prosperi et al. (2014) suggested that the concepts of vulnerability and resilience provide the elements to understand the factors and mechanisms affecting the sustainability of a SES.

3. Framing value chains’ contribution to sustainability and resilience of Socio-Ecological Systems.

3.1. The structure of the MOVING CAF

From an epistemological perspective, the MOVING conceptual framework hinged on the representation of a SES developed by McGinnis and Ostrom (2014) on the base of Ostrom (2009) and introduced in the previous section.

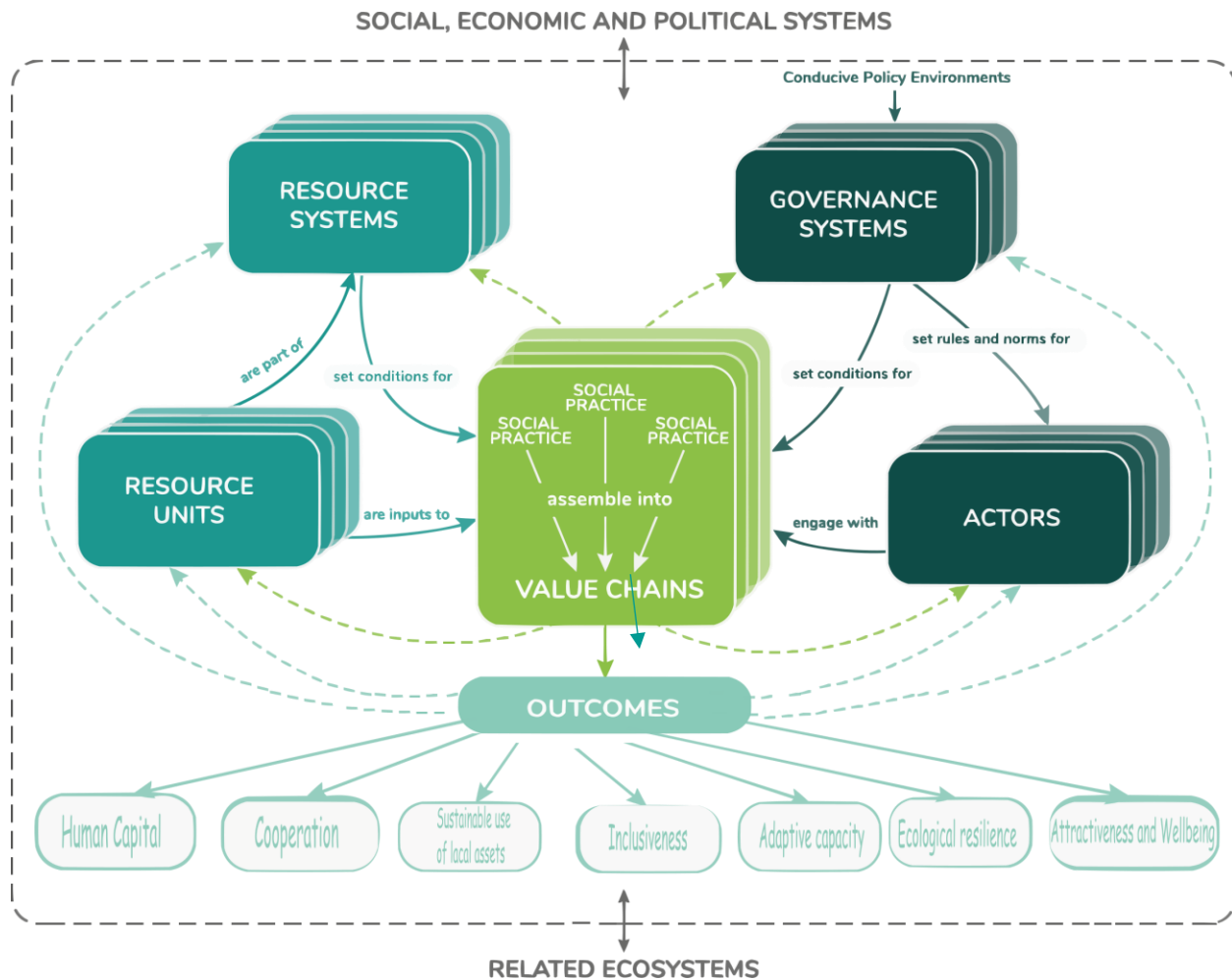


Figure 2: The MOVING Conceptual Framework

Fundamental elements of the framework are the four first-level core subsystems of a SES. These core subsystems interact with each other, and these interactions generate the outcomes of the SES: human capital, cooperation, sustainable use of local assets, inclusiveness, adaptive capacity, ecological resilience, attractiveness and wellbeing. These outcomes have emerged from the comparative analysis of the cases (Delgado-Serrano et al., 2024), and do not exclude, but rather assume the production of economic value. Moreover, the outcomes of a system may be also assessed in terms of [vulnerability](#) and [resilience](#) to exogenous factors (e.g., climate change, pressures from other systems). In this perspective, the vulnerability (including adaptive capacity) and resilience of a SES result from the interactions among the four core subsystems, through the social practices developed in the functioning of the value chains.

The nature of these four core subsystems ranges from material (resource units, resource systems and actors) to immaterial (governance systems) linking the social, economic, and political settings and characterising the SES. Resource units (i) (e.g., grass fields) interact with other resource units determining a resource system (ii) (e.g., grassland habitat), which are regulated by

governance systems (iii). Governance systems are sources of rules that regulate the activities of actors (iv), shaping their actions and behaviours (social practices) in relation to the other material component of the SES (resource units and resource system).

The subsystems can be vulnerable and/or resilient to specific factors both individually (e.g., climate change impacting on a resource unit, like a pollinator species, or the breakdown of a value chain impacting on the related workers) and in their interactions (fe.g., if actors are capable to re-design a governance system for a value chain when there is a sudden change in the market channels).

The proposed CAF highlights the importance of [social practices](#) which are routine interactions between actors and their environment including resource units and other actors. Local production techniques, for example, are practices based on knowledge, rules, resources available in a place and consolidated through social interaction. Actors operate as individuals and/or groups in a defined social context through social practices, that are based on culturally shaped norms, habits, beliefs and expectations.

Table 1 provides an overview on three examples of how value chains, through the social practices they rely upon, connect different components of a SES (these connections can be also extended to other SESs, as described in section 3.3). The table shows, as exemplification of the various subsystems, a summary of some main features of each value chain in relation to each SES component, whose dynamic interactions will be described below, starting from the concept of “practice”. The aim of this Table is just to offer an exemplification of the utilisation of the framework in three specific cases; more detailed descriptions with analysis of components and flows can be retrieved in Blackstock et al. (2022).

Table 1: Examples of connections among SES components in three selected case-study value chains

	Serbia - Sjenica - lamb	Switzerland – Tete de Moine Cheese	UK-Scotland - (Speyside Whisky)
<i>Resource Systems</i>	<ul style="list-style-type: none"> • High biodiversity natural pastures 	<ul style="list-style-type: none"> • Woodland pastures and livestock • Grass and forages • Rural landscape • Regional reputation 	<ul style="list-style-type: none"> • Local knowledge/culture • Protected areas (National Parks) • Mosaic of landscapes including petlands • Water infrastructures • Tourist infrastructures
<i>Resource Units</i>	<ul style="list-style-type: none"> • Typical local sheep breed • Katun traditional type of livestock breeding • Traditional feeding practices 	<ul style="list-style-type: none"> • Local cattle • Cheese-making knowledge • 9 cheese dairies and 2 refineries with related buildings, infrastructures. equipment 	<ul style="list-style-type: none"> • 29 distilleries, some with visitor centres • Malting barley (rarely local) • Spring water for dilution of the raw spirit

<i>Actors</i>	<ul style="list-style-type: none"> • Farmers sheep breeders and associations 	<ul style="list-style-type: none"> • Producers, Breeders' associations • Input and service providers • Quality certifiers 	<ul style="list-style-type: none"> • Farmers sheep breeders and associations
<i>Governance</i>	<ul style="list-style-type: none"> • Poor formalized cooperation, strong informal ties • Few independent slaughterhouses • Hierarchy, highly asymmetrical relations on both national and export markets 	<ul style="list-style-type: none"> • "Interprofession": managing quality and volumes produced by assigning production volumes • PDO with quality control and a third-party certification system • System of direct payments, including those for ecosystems services 	<ul style="list-style-type: none"> • Tourism organisations, • Knowledge and skills organisations • Catchment management • Environment strategies and organisations connected to the National Park and River Spey catchment area
<i>Practices</i>	<ul style="list-style-type: none"> • Seasonal sheep grazing • Selling of live animals • Slaughtering locally and at the farm • Sales at local markets, restaurants and hotels • Export and sales outside the MRL 	<ul style="list-style-type: none"> • Soil and natural vegetation management, • Farming, harvesting, processing • Direct selling, export, promotion campaigns • Collaborations between Gruyère and Tête de Moine value chains 	<ul style="list-style-type: none"> • Peatland and upland management to control water flows • Malting barley, creating mash, fermentation, distillation and maturation • Transport to markets, brand development, visitor centre tours
<i>Outcomes</i>	<ul style="list-style-type: none"> • Key economic activity of the region to sustain families and lifestyle • Organic and Halal certified and PDO registered products competitive on international markets. • Preservation of high biodiversity natural pastures 	<ul style="list-style-type: none"> • Milk and dairy selling and related incomes • Livestock grazing with use of farm fodder, maintenance of family farming, use of renewable energies. 	<ul style="list-style-type: none"> • Economic benefits from malt whisky production and from tourism • Preservation of local culture and traditions • Renewable energy production

Practices are aimed at creating and distributing values. The amount of value that actors can create is affected by the resource systems of the area, which constitute the [territorial capital](#). The territorial capital provides opportunities and constraints to practices. When a practice creates pressures on resource units, these may compromise resource systems' capacity to regenerate

resources, and therefore their sustainability. On the other hand, the territorial capital provides resources specific of a given SES, creating the conditions for the creation of value when these resources are exchanged with outside actors.

Social practices are developed within actors' [relational space](#) and are affected by normative, cognitive, and technical systems of rules, those for example that characterize social norms or local [techniques](#). Among the rules that regulate practices, there are the ones generated by the governance system. Governance systems may affect the evolution of social norms as well as local techniques, fostering new [technological pathways](#). The governance subsystem is a multi-level system, where "territorial" governance systems are directly affected by local actors and their normative, cognitive, and cultural norms with a straight effect on the other SES's subsystems, while larger scale governance systems (e.g., national, European, global value chains governance systems) are outside local actors' control and might collide with "territorial" governance systems. In many cases, unsustainable resource use can occur when larger scale governance systems replace local ones and alter the equilibrium between population and resources.

As business activities are continuous flows of connection/disconnection of (production-distribution-consumption) practices, [value chains](#) can be seen as [assemblages](#) of practices. To generate a value chain, actors performing different practices need to be connected: for example, a given quality of cheese is linked to grazing, and grazing is connected to grass management. Practices are connected to value chains through material and immaterial processes (production is connected to selling activities and this generates flows of products, money, information), and the modes of connection are influenced by the resource and the governance systems. By assembling social practices, actors interact with other actors to connect to existing value chains or to establish new value chains.

Looking at value chains as assemblages underlines their dynamic evolution, the possibility for actors to engage, through their practices, in different assemblages at the same time, and the fact that practices (and related human and non-human actors) assume specific properties in relation to each value chain they participate in. In a value chain, practices (e.g., in relation to production, processing, transport) evolve in relation to the connections with other practices, aligning around the development of objects of exchange (outputs for the producers/input for the processor).

Also, [Business models](#) can be seen as assemblages of practices made by entrepreneurs (it is a more actor-centred concept, as it describes the business strategies, vis-à-vis the more "systemic" concept of value chain), or by other organisations aimed at creating, adding, and distributing value. In other words, the business model is rather a concept to be applied at the "micro" level of analysis, whereas the value chain refers to the "meso" level. It follows that each of the value chains can be potentially characterised by one or more business models developed by the actors involved, which shape specific sub-chains within the general value chain. It follows that innovative business models - that is, original ways of assembling practices - contribute to innovate the value chains. Differentiated products - based on place, variety, or method of production - create value when business models are developed around them, and when they are channelled into differentiated value chains.

As recalled, value chains generate - through assemblages of practices - material and immaterial flows, aimed at the creation of value. A key aspect of the MOVING CAF is that the composition of the value created includes economic value (in terms of profits, salaries, taxes, etc.,) but also other values like human capital, cooperation, sustainable use of local assets, inclusiveness, adaptive capacity, ecological resilience, attractiveness and wellbeing (Figure 2). Different assemblages and different practices lead to different composition of value created and different distribution of value(s) between local actors and external actors. These values, and more generally the value chains outcomes, are relevant per se but they can also affect the resilience and the vulnerability of a SES.

It is worth underlying that not every value chain automatically provides economic, social and ecological values and contribute significantly to the SES resilience. This depends on the specific and territorial-based interlinkages between each value chain and the related SES components. However, the diversity of value chains in a territory serves as source of alternative options and synergies for the delivery of such positive outcomes, if adequately supported by the policy environment.

It is also important to highlight that the same concept of “assemblage” can be used to describe also, alongside the practices within a value chain and in the context of a business model, the dynamic interactions between value chains (through the practices connecting actors from different chains). In MOVING attention has been paid on how practices characterising different value chains might connect different chains and even co-produce each other. The assemblage approach proved to be capable to grasp the diversified and dynamic characters of such relations.

Finally, [Policy environments](#), that define the set of norms and regulations present in each social context and the capacity of SESs to implement these norms, influence the way business models and value chains evolve. Conducive policy environments are capable to support local actors in their innovation practices and give a direction to assemblages of practices to improve the sustainability and resilience of mountain areas.

Policy environments can be observed at the local level, in relation to the specific SES and the actors who take part in it. However, their drivers are identifiable at various geographical and institutional scales. There are regulations and policies set at national or more general level (EU, global), that shape practices and related networks/flows, like for example an EU regulation that allows or forbids a traditional food processing method. Others have the same “distant” origin and an indirect impact on the local level, like a cut to national budget for support to mountain areas. Finally, other norms and policies emerge from the local level itself, for instance when a municipality reserve a public parking for a Sunday’s farmers’ market. Each of these types of relation between policies and territories (or SES) contribute to the policy environment influencing actors’ practices and the evolvement of value chains.

3.2. Eleven propositions for the MOVING CAF

The concepts introduced in the previous section can be connected to each other in a frame based on a series of statements, whose starting point is the conceptualisation of our SES approach (Figure 2). These statements, taken together, describe the conceptual pathway that brings from the observation of the case-studies to the assessment of the MOVING main hypotheses, by using the concepts above underlined. Those sentences have been identified at the beginning of the process and have been, in their general orientation, validated by the field work as accounted for in several MOVING deliverables (see for e.g., Moretti et al. 2021a; Blackstock and Flanigan, 2021; Blackstock et al., 2022; Blackstock et al., 2023, Zagata et al. 2023, Delgado-Serrano et al. 2014). The last sentence stems from the reflection made on project's outcomes for the development of policy recommendations.

1. **Local actors engage in social practices**, that are routine interactions with resource units and with other actors.
- 2 **Practices are aimed at creating and distributing value**. The amount of value actors are able to create is affected by the resource systems of the area and their specificity, which constitute the territorial capital.
3. Social practices are developed within actors' relational space and are affected by **normative, cognitive, and technical systems of rules**, those for example that characterize social norms or technology pathways. Among the rules that regulate practices, there are the ones generated by governance systems.
4. **Actors interact with other actors to connect to existing value chains or to establish new value chains, with practices that can also connect value chains with one another.**
5. **Business activities are continuous flow of connection/disconnection of practices. Value chains can thus be perceived as assemblages of practices**. Looking at value chains as assemblages allows to capture the dynamics of actors engaging in different practices and value chains at the same time.
- 6 In a value chain, **practices** (e.g., in relation to production, processing, transport) **evolve in relation to the connections with other practices**, aligning around the development of objects of exchange (outputs for the producers/input for the processor).
7. Business models are different modes of assemblage: what to assemble? with whom to assemble? for what purposes?
8. **Connections among practices can extend beyond the local SES borders, across different SESSs**, connecting them through a range of interactions and outcomes (Figure 3). This means that many value chains (resulting from those practices) connect different SESs, depending on the specific conditions of each SES.
9. **Through these connections (in the form of Interactions and Outcomes) a value chain can influence different SESs**, with regard first to the value created and distributed in each SES,

but also to the effects on [vulnerability and resilience](#) of the various SESs that are connected by the value chain.

10. **Strengthening (new) value chains capable of creating value while enhancing SES sustainability and resilience in mountain areas**, is the goal to be pursued. It can be achieved thanks to the presence of a [conductive policy environment](#) capable to support local actors in their practices.

11. A conducive policy environment includes a **concerted approach to regional planning** with local communities, regional, national, EU authorities and strategies, and the search for solutions that are capable to address multiple challenges and to be flexible and adaptable to new circumstances.

3.3. Telecoupling Socio-Ecological Systems through social practices and value chains

Connections among social practices and value chains can extend beyond the borders of a SES and develop into socioeconomic and environmental interactions between distant coupled SESs (Figure 3). Through these connections, value chains can affect different SESs, regarding both the value created and distributed within each SES and the vulnerability and resilience of the interconnected SESs. In this perspective, value chains are conceived as instruments for [telecoupling](#) distant or neighbouring SESs. The crucial concept of telecoupling, already mentioned in the previous sections, deserves a more detailed description in the light of the overall MOVING CAF.

The telecoupling of SESs is made possible by actors which engage in practices to generate new or connect to existing value chains facilitating or hindering the flows of material/energy and/or information which generate socioeconomic and environmental effects that are manifested in coupled SESs. (Liu et al., 2013). Telecoupled SESs interact through unidirectional or bidirectional flows of materials, payments, and information that are transferred by actors engaged in the practices that are assembled to form value chains.

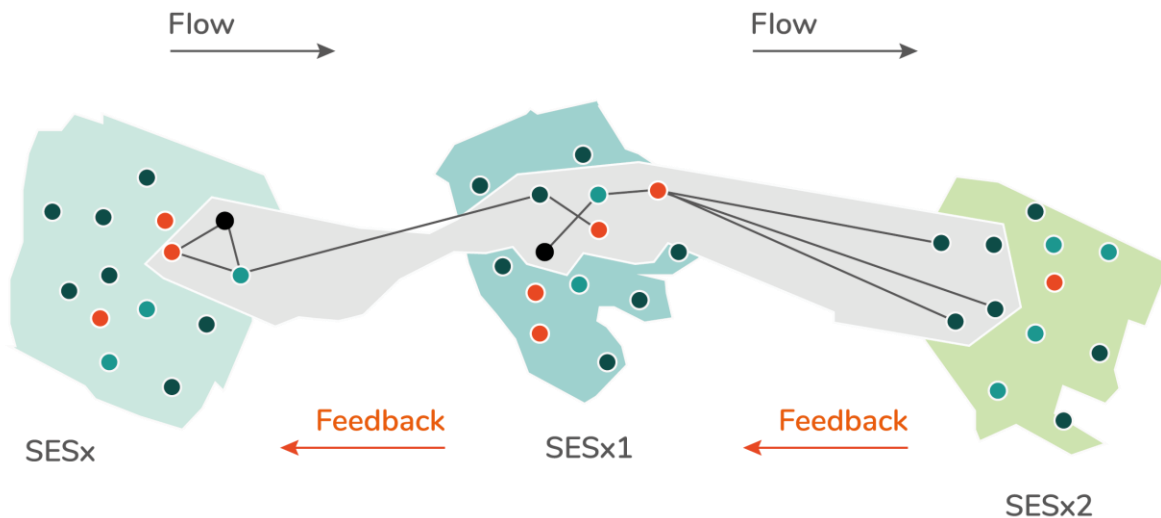


Figure 3: Telecoupled SESs through value chains (Source: Moretti et al., 2023)

Figure 3 (together with the following Figure 4) provides an easy to grasp visualisation to describe this web of flows and influences. First, we see that each SES, in a telecoupling, can behave as sending (SES_x), receiving (SES_{x2}), or intermediary system (SES_{x1}) according to the flows being analysed and to the phases that are being considered in each flow. The material and information flows between SESs in a telecoupling generates socioeconomic and environmental consequences that can promote or prevent the transition towards more sustainable and resilient SES (Eakin et al., 2017; Hull & Liu, 2018; Zimmerer et al., 2018). Therefore, any political, economic, cultural, technological, governance and ecological change affecting the SES, can generate new dynamics in the flows and impacts in the telecoupled system.

Beyond what is represented in Figure 3, it is worth reminding that, alike the SESs, also value chains are not isolated from the already mentioned “Related Ecosystems” (ECO), which are all subject to the overall climate (and more generally, ecological) conditions and evolution, as well as to the Social, Economic and Political Settings (S). A rule or norm established at large governance scale (e.g., Europe, World Trade Organization) or a technological trajectory (e.g., renewable energy) inevitably also influence the governance and the practices shaping the value chains within a SES.

Figure 4 provides a similar view on the relations between SESs, at a different level of detail, as it shows the components of each SES, as conceptualised in McGinnis and Ostrom (2014). Here again, SESs are telecoupled through flows of social practices and the outcomes resulting from the functioning of a value chain.

In the first SES (SES_1), resource units (RU), resource systems (RS), governance systems (GS), and Actors (A) interact through social practices to assemble a value chain which generates a range of outcomes (e.g., commodities, ecosystem services, cultural and social values). If all these interactions (I) and outcomes (O) (or at least all the crucial ones) remain within SES_1 (green arrows), we face what we can consider a short value chain (where the shortness relates to geographical proximity). Otherwise, some of these interactions and outcomes might cross SES_1 boundaries, affecting other SESs (red; light and dark blue arrows) through the process of telecoupling.

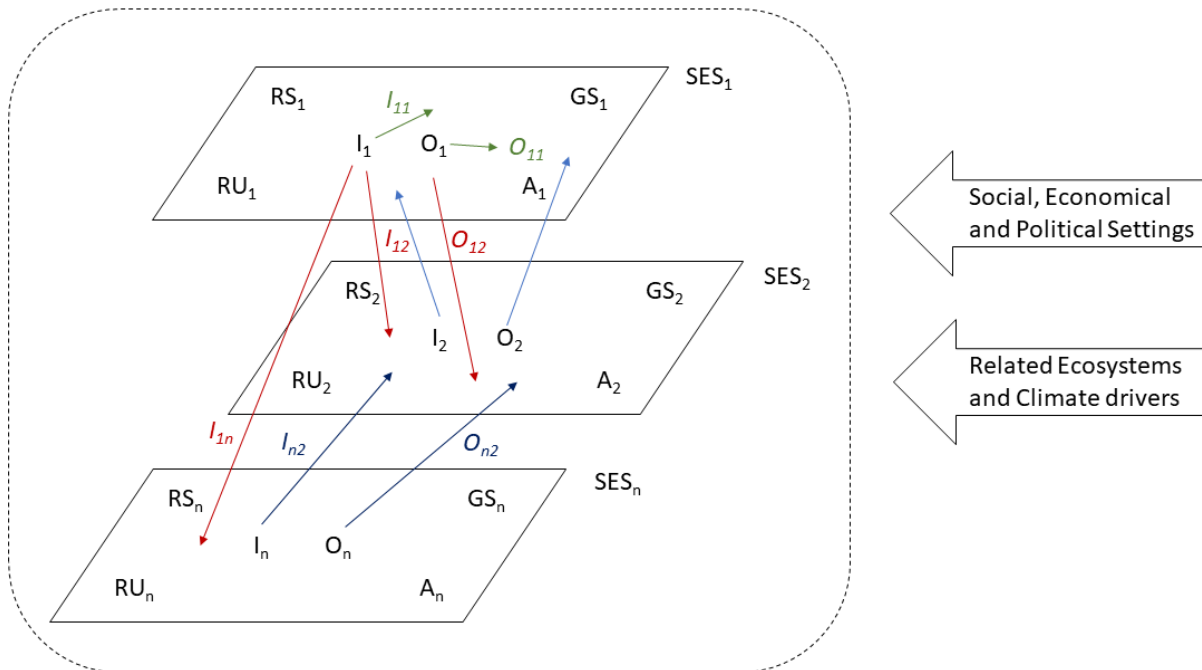


Figure 4: Connections among telecoupled SESs in consequence of the activation of value chains

Changes in the governance of value chains can alter the interplay of supply in the sending SES (SES_1) and demand in the receiving SES (SES_2) transforming the material, immaterial, and information flows among these SESs and thus the structure and boundaries of the telecoupled system.

The dynamic outlined can generate feedback mechanisms where the effects of SES_1 on SES_2 affect in turn SES_1 . For example, actors belonging to SES_1 engage in social practices and value chains which exploit an unreproducible resource localised in the SES_1 (e.g., a forest used for wood production) to produce the outcome O_1 . If the interactions within SES_1 lead to excessive extraction and reduced availability of the unreproducible resource (wood), the supply of the unreproducible resource to SES_2 decreases. Assuming the demand for the unreproducible resource remains constant in the receiving system (SES_2), to satisfy this demand the boundaries

of the telecoupled system must be extended to include another SES (SES_n) supplying the same outcome (O_n).

The inclusion of SES_n can, in turn, decrease the amount of O_1 demanded by SES_2 to SES_1 in favour of the newly added SES_n . Similar dynamics of effects and feedback mechanisms can be described for interactions (I) among different SESs.

Effects and feedback mechanisms are important properties of telecoupled systems, they can be positive or negative, and can affect socioeconomic and environmental properties of the telecoupled SESs, thus promoting or hindering their sustainability and resilience (Liu et al., 2013).

During the field work and reflexive analysis of MOVING outcomes, it has been decided to focus also on extra-regional and even global linkages, which appeared to be crucial for the comprehension and the functioning of the value chains in most of the case-studies. The extension of the value chains beyond local and national boundaries is accounted for in Blackstock et al. 2022, where it is also argued that most telecoupling occurred in the later stages of chains, as also underlined in Barjolle et al. 2024.

In general, this telecoupled influence has the potential to be positive, i.e. in the direction of reduced vulnerability and increased resilience, under certain conditions, that have been explored case by case. For example, it can be expected that value chains that contribute to diversification (of practices, networks, resource use patterns, value creation processes, connections with other SES, etc.) can enhance sustainability and resilience of mountain SESs by increasing the options available to react to stressors and shocks, while also delivering other positive outcomes in terms of value(s) production. Conversely, some value chains can lead to less positive outcomes, as reduced diversity, over-exploitation of resource units or resource systems, dependency on single upstream or downstream markets generating negative impacts on SESs' sustainability and resilience.

4. Implication for analysis

As argued, the purpose of MOVING was to analyze how different value chain configurations can contribute to the resilience of SESs in European mountain areas. Given the variety of European mountain areas, that are characterised by specific contextual features and challenges, an inventory has been developed in the aim to cover the diversity of mountain value chains' configurations in EU Members States and associated countries (Moretti et al., 2021a). Moreover, for analytical purposes, products and value chains in 23MRRs have been selected as case studies (Blackstock et al., 2022). In each MRR, the natural resources characterising the SESs (Pinto-Correia et al., 2022) as well as the case-study value chains have been identified (Blackstock K. and Flanigan S., 2021).

According to the focus of this CAF on the importance of practices and on the wide concept of "value", well beyond the economic sphere, the selection of the value chains was based on the consideration of the primary resource base, including natural assets and knowledge, on which they relied upon, in the aim to link value chains analysis to the vulnerability of land use systems

vis-à-vis ecological and socio-economic stressors. In this perspective, the 23 selected value chains were not necessarily those responsible for most of the employment or economic value, but rather those capable to illustrate how natural (and cultural) resources are enrolled in local valorisation activities, creating wider value also when telecoupled to other SESs. Attention was also paid to value chains based on circular processes, ecosystems provision, innovative governance, local culture resources (Blackstock K. and Flanigan S., 2021).

From what argued in the previous sections in relation to the interplay between value chains and SESs, another element considered in the selection of the value chains follows: the attention to how a value chain was linked or anchored to the SES of the selected MRR and MRL (and to other SESs through telecoupling). The value chains that mobilised SES components (resources units and systems, actors, governance systems, etc.), in such a way to potentially have an influence on the SES sustainability and resilience were the ones of interest for MOVING.

These value chains have been further investigated through the involvement of Multi-Actor Platforms (MAPs) gathering relevant stakeholders and created in each case study area by means of dedicated engagement methodologies. Moreover, dedicated methodologies have been developed within the project to provide guidance and protocols to build the representation of the value chain and assess its contribution to the resilience and sustainability of its embedding SES in each MRRMRR.

The configurations of the value chains have been analysed in terms of resource use, material and non-material flows, actors, practices, governance, assemblages with other value chains, and telecoupled SESs whit the aim of identifying its impacts on the respective SES in terms of resilience and contribution to sustainable development (Blackstock et al., 2022; Zagata et al., 2023). The outcome of this analysis allowed to identify opportunities and lock-in mechanisms and to set targets to be achieved to ensure the resilience and sustainable development of mountain areas (Blackstock et al., 2023),

Table 2 summarises the analytical questions which guided the value chain analysis. The order in which framework components and analytical questions are listed does not reflect an opinion concerning their relevance for the value chain analysis in MOVING.

Table 2: Analytical questions for the value chain analysis in MOVING

Framework components	Analytical questions
Practices	What are the most relevant practices carried out by the actors of the observed value chain that may affect the sustainability and the resilience of the region? What is the know-what and the know-how used? How are practices assembled into the analysed value chain?
Value Chain	What is the importance of the relevant practices in the value chain? Are the actors connected with other value chains?

Framework components	Analytical questions
	<p>How did the actors change the practices when joined other connected value chains?</p> <p>Which are the value chains' outcomes that should be included in the analysis of the value created by a value chain?</p> <p>Who are your main customers and suppliers in the value chain?</p> <p>What are the most important functions/activities/flows in the value chain?</p>
Resource Units	What are the resource units the practices and the value chain rely upon?
Resource Systems	<p>What are the resource systems the practices and the value chain rely upon (exploit, valorise)?</p> <p>Which of these resource systems are internal and which external to the SES?</p> <p>Are these resource systems under- or over-exploited?</p> <p>Are exploited resource systems private, public or collectively owned?</p> <p>What is the geographical distribution of resource systems involved in value creation?</p>
Actors	<p>Who are the relevant actors involved in the value chains?</p> <p>Which are the actors performing the practices? Are they individual or collective?</p>
Governance	<p>What formal and informal governance systems shape or influence the practices at the local level?</p> <p>Which technological pathway provides the background against which practices have developed?</p> <p>What are the power relations within the assembled value chain, with special regard to small players (e.g., small farmers)?</p> <p>Did the governance system of the value chain has changed? If yes, how?</p> <p>Does the local governance system support local actors in the realization of practices? And in the creation of new practices?</p>
Outcomes	<p>What are the outcomes of the practices? What values (economic, social, cultural, ecological, symbolic) are generated?</p> <p>From which practice most of the value comes from?</p> <p>How does your value chain contribute to resilience and sustainability of the local SES?</p> <p>Which characteristics and which functions of the value chain can reduce the identified vulnerabilities for the SES and enhance its resilience?</p>
Socio-economic and political setting	Which norms and formal and informal rules shape or influence the practices at the regional, national, and global level?
Related Ecosystems	<p>What are the resource units or actors external to the local SES?</p> <p>Do identified assemblages connect the case-study SES with other SESs?</p> <p>How many SESs are telecoupled through the value chain?</p> <p>Where are they located, also in relation to the SES under study?</p> <p>How are the values (or dis-values) distributed among the telecoupled SESs?</p>

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Glossary

Assemblage

The concept of “assemblage” has been proposed by DeLanda¹, who has developed the reflections by Deleuze and Guattari². In general terms, the assemblage can be conceived as a metaphor that describes complex social objects in which heterogeneous components that may be human and non-human, technical and natural, interact with each other while retaining (regarding purposeful agents) their capacity to act autonomously, including the capacity to leave an assemblage and to participate in more than one assemblage at the same time. Assemblage thinking also highlights the contingency (and intrinsic instability) of any configuration of elements, which are constantly evolving under changing conditions. From a different perspective, the assemblage approach underlines that there are elements (parts) that interact with each other in a way that together they have properties not referable to/observable in the individual elements³. These properties are inherently relational, they assume relevance only through the connections/interactions that each element establishes with others.

Business Model

A Business Model (BM) is a conceptual scheme of an enterprise (or in general of an organization), which describes the rationale of how the value is created and captured considering key internal components and key external linkages. This representation constitutes a point of arrival but also of departure of a trajectory that is the result of management decisions (dynamic character)⁴. The expression was first probably used in business modelling software. In the 90s, with the development of Internet, it spread among managers and scholars, who tried to clarify its meaning⁵, also connecting it to business strategy in an innovation perspective, and showing its closeness to other concepts, as Networks or Clusters, Business ecosystems, and Value chains⁶. The literature suggests considering the following elements to identify a BM: 1) key Resources and

¹ DeLanda M. (2006). *A New Philosophy of Society: Assemblage Theory and Social Complexity*, Bloomsbury Publishing PLC, London.

² Deleuze, G., Guattari, F. (1987). *A thousand plateaus: capitalism and schizophrenia*, University of Minnesota Press, Minneapolis MN.

³ DeLanda (2006). *A New Philosophy of Society: Assemblage Theory and Social Complexity*, Bloomsbury Publishing PLC, London.

⁴ See among others: 1) Osterwalder, A., & Pigneur, Y. (2010). *Business model generation: A handbook for visionaries, game changers, and challengers*: (self-published). 2) Burkhart, T., Krumeich, J., Werth, D., and Loos, P., "Analyzing the Business Model Concept — A Comprehensive Classification of Literature" (2011). ICIS 2011 Proceedings. <https://aisel.aisnet.org/icis2011/proceedings/generaltopics/12>

⁵ See among others: Massa, L., Tucci, C. L., Afuah, A., A Critical Assessment of Business Model Research, *Academy of Management Annals*, 2017, Vol. 11, No. 1, 73–10; DaSilva C. M., Trkman P., *Business Model: What It Is and What It Is Not*, *Long Range Planning* 47 (2014) 379–389; George, G., Bock, A.J., 2011. The business model in practice and its implications for entrepreneurship research. *Entrepreneurship Theory and Practice* 35 (1), 83–111; Fiet, E. 2014, 'Conceptualising Business Models: Definitions, Frameworks and Classifications', *Journal of Business Models*, Vol. 1, No. 1, pp. 85-105; Baden-Fuller C. and Morgan M. S., *Business Models as Models*, *Long Range Planning* 43 (2010) 156-171.

⁶ Zott, C., & Amit, R. H. (2013). The Business Model: A Theoretically Anchored Robust Construct for Strategic Analysis. *Strategic Organization*, 11 (4), 403-411.

Competences; 2) Organization (Key activities, key partnerships, and networks); 3) Value proposition (Customer needs and interaction, Channels, Pricing logic)⁷.

Conductive policy environment

The concept of policy environment refers to the understanding of 'policy' as a process, that consists of sequences of stages such as problem definition, agenda setting, policy design, policy implementation, policy evaluation⁸. Because of this approach, the outcomes of a policy cannot be related only to the legislative act that has generated the policy, but to the concrete web of interaction between a multiplicity of involved actors. Actors have a different impact according to the stage of the policy process: civil society organization have a key role in the problem definition, political parties in the agenda setting, governments in the policy design, decentralized administrative bodies in the policy implementation, specialized bodies in the policy evaluation stage. Each of these stages can influence the others: for example, public opinion or implementation failure can bring to policy redesign, and policy evaluation can make new problems emerge. The policy environment is thus characterized by the policies, the actors, their patterns of interaction at each stage. A conducive policy environment is generally referred to enterprises, as a policy environment that allows enterprises to operate successfully and achieve their objectives.

Social Practice

The concept of "practices" is developed regarding the Social Practice Theories (SPT), based on the reflections made by sociologists like Bourdieu⁹, Giddens¹⁰, Foucault¹¹, and then developed by other sociologists and anthropologists with reference to specific fields of application. In Shove et al. (2012), social practices are actions-based routines characterized by material elements (objects, tools, infrastructures) and organised with a purpose on the base of available competences and expressing specific meanings (conventions, expectations, tastes)¹². Thus, a practice is realized on the base of these three elements: material components, competences, meanings (and influenced by actors' habits and attitudes). SPT overcomes the dichotomy between structuralist and functionalist approaches on the one side, and more subjectivist and individualist views on the other: the central unit of analysis is to be found neither on society, nor in autonomous self-determined individuals, but in the meso-realm of "practices"¹³.

⁷ See among others: Demil, B., Lecocq, X., Business Model Evolution: In Search of Dynamic Consistency. Long Range Planning 43, 2010, 227-246; Osterwalder & Pigneur (aforementioned); George, G. & Bock, A. J., The Business Model in Practice and its Implications for Entrepreneurship Research. (2011). Entrepreneurship Theory and Practice. 35, (1), 83-111. Research Collection Lee Kong Chian School Of Business). Teece D. J., Business models and dynamic capabilities Long Range Planning 51, 2018, 40-49

⁸ Araral, E., Fritzen, S., Howlett, M., Ramesh, M., & Wu, X. (Eds.). (2012). Routledge handbook of public policy. Routledge.

⁹ Bourdieu, P. (1977). Outline of a Theory of Practice, Cambridge University Press, New York.

¹⁰ Giddens, A. (1984). The Constitution of Society: Outline of the Theory of Structuration, Stanford University Press, Palo Alto, CA.

¹¹ Foucault, M. (1978-1986). The History of Sexuality, vol. 1, An Introduction, trans. R. Hurley, Pantheon, New York.

¹² Shove, E., Pantzar, M., & Watson, M. (2012). The dynamics of social practice: Everyday life and how it changes. Sage.

¹³ Hargreaves, T. (2011). Practice-ing behaviour change: applying social practice theory to pro-environmental behaviour change, Journal of Consumer culture 11 (1): 79-99.

Relational space

According to the relational approach, space is not a ‘container’, but a ‘stabilization’ of processes and relations between entities¹⁴. This approach stresses change over stability, and the need for a study of difference between places not as ‘natural’ and a-historical features, but as the outcomes of relational dynamics. This approach looks at space as an ‘open’ entity, where entities meet and interact. ‘What gives any place its specificity is the constellation of relations that meet and weave together at a particular locus’. To this regard, ‘local’ and ‘global’ are considered ‘nodes in relational settings’ and are defined in relation to the density and frequency of relations. The concept of relational space allows an understanding of the power relations underlying spatial differences, and opens to new approaches to development, that look at resource flows, at the ‘positioning’ of places in systems of differences, and at the capture of flows through relational configurations as keys to development strategies¹⁵. With this approach, network analysis becomes the key analytical tool for geographical studies.

Specificity

The concept of “specificity” relates to the resources characterising a confined geographical area (e.g., municipality, region, mountain area) – local resources - that are embodied in the value chains’ products. In the neo-endogenous development approach, these resources are defined as endogenous capital that are mobilised, within value chains, to create value. The concept of specificity is attributed to the subset of resources, also defined as “club goods”¹⁶ (a subset of public goods which are non-rivalrous up-until the point of congestion and excludable) in the economic literature, which are accessible to those belonging to a local community¹⁷. According to Bourdieu¹⁸, the capital forms that can be designated as endogenous capital are the economic, social, cultural, symbolic, and – accounting for the specificity of rural areas – also natural³⁴ (e.g., local biodiversity, landscape patterns, geomorphological formations) endowed by a rural community.

Socio-Ecological System

Social–ecological systems (SES) are complex, interdependent, and linked systems of people and nature which are nested across scales¹⁹. They reflect the idea that people (the social system) are part of ecosystems (the ecological system) and shape them according sets of norms and rules

¹⁴ Murdoch, J. (2005). Post-structuralist geography: a guide to relational space. Sage.

¹⁵ Harvey, D. (2006). Spaces of global capitalism. Verso.

¹⁶ Cornes, R., & Sandler, T. (1996). The theory of externalities, public goods and club goods (2nd ed.). Cambridge: Cambridge University Press.

¹⁷ Brunori, G. (2006). Post-rural processes in wealthy rural areas: hybrid networks and symbolic capital. In Between the local and the global. Emerald Group Publishing Limited.

¹⁸ Bourdieu, P. (1998). Practical reason: On the theory of action. Stanford University Press.

¹⁹ Fischer, J., Gardner, T. A., Bennett, E. M., Balvanera, P., Biggs, R., Carpenter, S., ... & Luthe, T. (2015). Advancing sustainability through mainstreaming a social–ecological systems perspective. Current Opinion in Environmental Sustainability, 14, 144-149.

(institutions²⁰) and are at the same time dependent on the capacity of ecosystems to provide services for human wellbeing and societal development such as supply of food, fibre, energy, and drinking water. SES are structured in different subsystems which are independent of each other in the accomplishment of many functions but eventually affect each other's performance²¹. In a SES, the resource units (RU), the resource system (RS), the governance system (GS) and the users (U) deliver outcomes (O) as result of interactions within them and with the social, economic, and political settings (S) and the related ecosystems (ECO)^{22,23}.

Susceptibility, Vulnerability and Resilience

These are interrelated concepts that require to be defined one in relation to the other, for easier understanding. Thus, they are listed here below, as an exception to the overall alphabetical order of this glossary.

- Susceptibility

Susceptibility is often understood as equal to exposure. In our view, the concept of "susceptibility" includes the concept of "exposure", although it is more elaborated, or detailed. Exposure means the nature and degree to which a system experiences environmental or socio-political stresses, including the characteristics of the disturbance regime: magnitude, frequency, duration, and real extent. However, in a mosaic of land use systems, a given landscape can be exposed to a certain disturbance regime but showing spatial variability in the "susceptibility", e.g., the probability of each landscape element (e.g., land use system), or landscape unit (spatial differentiation of units), of being affected by the disturbance. A considerable part of the ecological disturbances shows a certain level of selectivity for types of elements in the landscape, in regimes of low or moderate disturbance intensity. This is the case also for most socio-economic disturbances. This selectivity decreases with increasing severity of the conditions driving the disturbances. Ultimately, for the most detailed scales "exposure" can be the same as "susceptibility", and the concepts come together again when the disturbances are so severe that they do not show selectivity between landscape elements. Susceptibility can then be conceptualized as the probability of a landscape or land use element to be affected by a particular disturbance.

- Vulnerability

Vulnerability identifies the expected losses and damages related to specific disturbances, acknowledging that different elements of a system might be affected differently by these

²⁰ Ostrom, E. 1990. Governing the Commons: the Evolution of Institutions for Collective Action. Cambridge: Cambridge University Press.

²¹ Ostrom, E. (2007). A diagnostic approach for going beyond panaceas. Proceedings of the national Academy of sciences, 104(39), 15181-15187.

²² Ostrom, E. (2009). A general framework for analyzing sustainability of social-ecological systems. Science, 325(5939), 419-422.

²³ McGinnis, M. D., & Ostrom, E. (2014). Social-ecological system framework: initial changes and continuing challenges. Ecology and Society, 19(2).

disturbances. According to Adger 2006²⁴, vulnerability includes the aspect of exposure, which is part of susceptibility, but also the aspect of sensitivity and adaptive capacity. Adaptive capacity focuses on the capacity of individuals, social groups, and organizations to pursue adaptation (Murphy et al. 2015) and highlight the capacity (and will) of individual and communities to pursue adaptation to shocks and pressures. Adaptation can entail a restructuration of networks and flows, as well as a change in the business models of the impacted value chains. Capacity depends not only on human skills and attitudes, but also on the structure and flexibility of the systems and its components, and on the availability of resources and different options. Overall, vulnerability can be defined as the propensity of exposed elements such as land use systems, landscape features, social groups, local communities, and their activities to suffer adverse effects when impacted by disturbance events. These events can be of distinct magnitude, frequency, duration, and they can occur in the form of sudden shocks or continuous stressors. To this, the different elements will react differently: the disturbance can cause damage to some elements of the system in consideration, and not to others. This means that some are "vulnerable", and others are not. For complex socio-ecological systems, the consequence of vulnerability, or the size of expected losses and damages, or in turn eventually benefits, depends on the qualities of the natural components of the ecosystem, and on the system of knowledge, values, interests and needs prevailing in the area considered.

A specific perspective is the "contextual vulnerability", that considers vulnerability as highly influenced by social, political, economic, and ecological contextual elements, with a focus on social, cultural and economic components of the vulnerability of a SES.

- Resilience

The concept of resilience, starting from its original meaning of "bouncing back" or "withdraw", mainly referred to physical systems to describe the stability of materials, has rapidly spread in the last decade in the academic and then in the public and policy sphere, first regarding ecosystems and then applied to socio-ecological systems in the aim to frame the analysis of their capability to recover after a perturbation. Its adaptation to the ecological systems and processes comes mainly from natural sciences and hinges on the seminal work on adaptive cycles. A classical definition is given by the Resilience Alliance: "*resilience is the capacity of a social-ecological system to absorb or recover from perturbations and other stressors such that the system remains within the same regime, essentially maintaining its structure and functions*"²⁵. In sum, resilience is the capacity of a system to 'maintain its basic functions and return to the original state after a perturbation'. Resilience can only be measured along time. For the elements of the landscape or land use system mentioned above, there is the possibility that they possess the ability to return to the pre-disturbance stable state.

Technology Pathways

²⁴ Adger, W. N. (2006). Vulnerability. *Global environmental change*, 16(3), 268-281.

²⁵ <https://www.resalliance.org/resilience>

Technology Pathways are cumulative and path-dependent processes (*trajectories*²⁶) along which a technology progresses and evolves. These processes are influenced by the conventional knowledge and shared cognitive frames of technology practitioners and societal actors in the broader socio-technical landscape²⁷. Technological Pathways are shaped and constrained by the *technological paradigms*² or *regimes*²⁸ in which they have been initiated, which represent the prevailing models and routines for the solution of socio-technical problems^{22,29}.

Telecoupling

The concept of telecoupling represent the logical broadening of the concepts of coupled socio-ecological systems¹⁹ and their dynamics³⁰. Telecoupled systems consists of three components: agents, causes, and effects that generate information, economic resources, and material flows to interrelate a set of apparently distant Socio-Ecological systems³¹. In telecoupled systems, a disturbance in one system (the “sending system”)²⁹ can propagate to the interrelated systems (the “receiving systems”)²⁹ generating unexpected effects, especially if the former dominates the material and non-material flows and the latter are highly sensitive to changes in the dynamics of these flows³². The effects include positive or negative environmental and socioeconomic impacts that can promote or prevent the transition towards more sustainable and resilient Socio-Ecological Systems^{30,33,34}.

Territorial Capital

Territorial Capital is defined as all the local, tangible and intangible, endogenous and exogenous assets, of public and private nature, that constitute the development potential of an area³⁵. In an economic perspective, territorial capital is regarded as a distinct bundle of assets which attracts investments and makes the return of certain investments higher than in other regions³⁶. These assets are a system of: a) localised externalities, both pecuniary (where their advantages are

²⁶ Dosi, G. (1982). Technological paradigms and technological trajectories: a suggested interpretation of the determinants and directions of technical change. *Research policy*, 11(3), 147-162.

²⁷ Geels, F. W. (2002). Technological transitions as evolutionary reconfiguration processes: a multi-level perspective and a case-study. *Research policy*, 31(8-9), 1257-1274.

²⁸ Rip, A., & Kemp, R. (1998). Technological change. *Human choice and climate change*, 2(2), 327-399.

²⁹ Markard, J., & Truffer, B. (2006). Innovation processes in large technical systems: Market liberalization as a driver for radical change?. *Research policy*, 35(5), 609-625.

³⁰ Walker, B., Holling, C. S., Carpenter, S. R., & Kinzig, A. (2004). Resilience, adaptability and transformability in social-ecological systems. *Ecology and society*, 9(2).

³¹ Liu, J., Hull, V., Batistella, M., DeFries, R., Dietz, T., Fu, F., ... & Zhu, C. (2013). Framing sustainability in a telecoupled world. *Ecology and Society*, 18(2).

³² Eakin, H., Rueda, X., & Mahanti, A. (2017). Transforming governance in telecoupled food systems. *Ecology and Society*, 22(4).

³³ Hull, V., & Liu, J. (2018). Telecoupling: A new frontier for global sustainability. *Ecology and Society*, 23(4).

³⁴ Zimmerer, K. S., Lambin, E. F., & Vanek, S. J. (2018). Smallholder telecoupling and potential sustainability. *Ecology and Society*, 23(1).

³⁵ Camagni, R. (2008). Regional Competitiveness: Towards a Concept of territorial capital. In R. Capello, R. Camagni, B. Chizzolini, & U. Fratesi (Eds.), *Modelling regional scenarios for the enlarged Europe: European competitiveness and global strategies*, (pp. 33–48). Berlin: Springer Verlag.

³⁶ OECD (2001), *OECD Territorial Outlook*, Paris

appropriated through market transactions) and geographical (when advantages are exploited by simple proximity to the source); b) production activities, traditions, skills and know-hows; c) proximity relationships which constitute a ‘capital’ – of a social, psychological and political nature, d) cultural elements and values which attribute sense and meaning to local practices and structures and define local identities; and e) rules and practices defining a local governance model. A more encompassing understanding, where environmental assets are also included, is provided by the geographic perspective, where territorial capital is conceptualized as all geographically bounded assets of a territorial nature on which the competitiveness potential of regions and places reposes, which can be broken down into further sub-dimensions, as the economic, human and labour market, social, institutional, environmental, cultural and symbolic^{37,38}. For MOVING, dealing with mountains which are spaces where nature assets and the environmental conditions are so determinant of human activity, this integration is crucial.

Value

Value is a perceived benefit. Within a value chain, it is the benefit that each of the components of the supply chain gets from the participation to its activities³⁹. The evolution of the concept of value crossed the economic theories from its first conceptual definition in the 1600. During the mercantilism time, the value came from the “trade”, one century later in the physiocrats time, the value was related to the “Land”, while in 1800 the value came from the “labour” inside the product. Starting from 1900 to now, the concept of value comes from the “preferences”. In a market environment, value is translated into ‘market value’, that depends on the willingness to pay of final users. Today, the concept of value has two specific meanings “the amount of money something could be sold for” and also “how useful or important something is” (Cambridge dictionary). To put together these two elements, we must consider the “direct value” but also the “non direct value” and, in some specific cases, also the “option value” that are specific components of the Total Economic Value⁴⁰.

Value chain

Value chain (VC)⁴¹ is the network of actors and activities geographically localised that - through upstream and downstream “often intricate” linkages (inputs, outputs, financial flows, information, etc.) - provide the consumer with a product (or service) obtaining in exchange a value to be

³⁷ Camagni, Roberto. 2019. “Territorial Capital and Regional Development: Theoretical Insights and Appropriate Policies.” P. 688 in Handbook of Regional Growth and Development Theories, edited by R. Capello and P. Nijkamp. Handbook of Regional Growth and Development Theories.

³⁸ Safonte, G. Fabiola and Ferdinando Trapani. 2017. “A Theoretical and Methodological Framework for the Analysis and Measurement of Environmental Heritage at Local Level.” Energy Procedia 115:487–501.

³⁹ Maxwell, S. (2007). The Price is Wrong: Understanding What Makes a Price Seem Fair and the True Cost of Unfair Pricing

⁴⁰ Pearce, D. W.; Turner, R. K. (1989). Economics of Natural Resources and the Environment, Johns Hopkins University Press

⁴¹ The expression is generally attributed to Porter: “The scope of a firm’s activities is to have a powerful role in competitive advantage through its influence on the value chain.” Michael E. Porter, Competitive Advantage Creating and Sustaining Superior Performance, The Free Press Division of Macmillan, Inc., 1985 (Chapter 2).

distributed between the components of the chain⁴². The “vertical” concept of VC on one hand can be connected to that of Filière and the other hand to those of Commodity Chain and Supply Chain (the latter emerged in logistic management)⁴³. The VC approach has been used to describe the shift in the organization of global production toward external networks, giving rise to the Global Value Chains (GVC) concept⁴⁴. In the last decades, the VC – in particular the GVC – perspective has gained significant influence in development studies, leading to a standardized analytical procedure known as Value Chain Analysis (VCA)⁴⁵. The key elements of a VCA approach can be summarized as follows: input-output structure; geographical (spatial) characters; governance structure; institutional contexts⁴⁶.

⁴² Christopher M., & Peck H., Building the Resilient Supply Chain, International Journal of Logistics Management, Vol. 15, No. 2, pp1-13, 2004; European Commission, Value Chain Analysis for Development (VCA4D), Methodological Brief - Frame and Tools, Version 1.2, April 2018.

⁴³ See e.g., Michael Hugos, Essentials of Supply Chain Management, John Wiley & Sons, Inc., Hoboken, New Jersey, 2003.

⁴⁴ See: Timothy J. Sturgeon, From Commodity Chains to Value Chains: Interdisciplinary Theory Building in an Age of Globalization, in: From Frontiers Of Commodity Chain Research By Jennifer Bair, (C) 2008 by the Board of Trustees of the Leland Stanford Jr. University.

⁴⁵ We remember here: the FAO procedure; the GIZ technique; and the VCA4D previously mentioned.

⁴⁶ Gary Gereffi & Karina Fernandez-Stark, GLOBAL VALUE CHAIN ANALYSIS: A PRIMER, Center on Globalization, Governance & Competitiveness (CGGC), Duke University, Durham, North Carolina, USA, May 31, 2011.