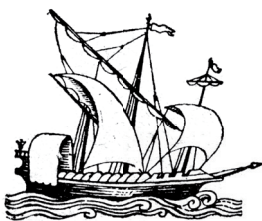


# ANNALI DI RICERCHE E STUDI DI GEOGRAFIA



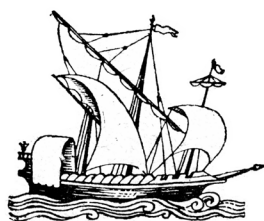
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# ANNALI DI RICERCHE E STUDI DI GEOGRAFIA



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anno LXXIX-LXXX, n.s. - volume unico 2023-2024

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GABRIELE CASANO\*

Editorial: from territorialisation to community resilience and vice versa

*Editoriale: dalla territorializzazione alla community resilience e viceversa*

### *Introduction*

If we define geography as the study of «the ways in which space is involved in the operation and outcome of social and biophysical processes» (Gregory *et al.* 2009; p. 288), then it is necessary to emphasise the role that space plays in an ongoing reshaping of the resilience concept. In order to carry out such analysis, it is possible to rely on another notion, already widely treated and defined, which is that of territorialisation (Raffestin, 1984, 2012; Turco, 1988; 2010).

In the words of Turco (1988, p. 76): «Territorialisation is thus a process, by virtue of which, space incorporates anthropological value; the latter is not added to physical properties but absorbs them, reshapes them and puts them back into circulation in variously culturalised forms and functions»<sup>1</sup>. Thus, considering the territory as a space on which human action is exercised, territorialisation must be considered as a lasting, complex, and progressive process, a mutual interaction between the physical environment and human action. Similarly, processes attributable to the enhancement of resilient practices in a community context incorporate and reshape forms of territorialisation. Consequently, it is possible to identify a multiplicity of so-to-speak territorialising acts in resilient strategies, namely, the ensemble of those signs that humans imprint on space, marking it as their construction.

Community resilience represents a complex set of strategies implemented and redefined over time that occur at different temporal and spatial scales (Adger, 2000; Walker *et al.*, 2004; Carpenter *et al.*, 2001; Folke *et al.*, 2010;

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<sup>1</sup> Author's translation from Italian.

Davoudi, 2012; Alexander, 2013). It could be described as a seamless socio-environmental becoming that produces its effects on space and people according to vastly different trajectories, depending on the context and actors involved (Wilson, 2012; Vaneeckhaute *et al.*, 2017; Rogers *et al.*, 2020; Tozzi, 2021). Community resilience mirrors the implications of a set local context in social, political, and environmental terms. Consequently, in light of the increased unpredictability of risky events related to global climate change (IPCC, 2022), this mirroring process is potentially undermined, and the impacts in terms of territorialisation change are even more relevant. Community resilience may be observed and explained through territorialisation processes, as it involves reciprocal processes of interaction between the physical environment and human acts.

The debate on community resilience is extremely vibrant and, recently, several scholars have improved the comprehension of this concept and its operationalisation in the field to support activities at the local level, the main aim has been to reinforce a holistic perspective of community resilience that consider participatory approaches and context-based analysis (Berkes, Ross, 2013; Esparcia *et al.*, 2015; Matarrita-Cascante *et al.*, 2016; Sharifi, 2016; Brunetta *et al.*, 2019; Robertson *et al.*, 2021). Furthermore, academia has developed significant attention to the combination of phenomena that affect communities in the age of global climate change, considering its complexities and intricacies in terms of related phenomena profoundly impacted like extreme events, migratory patterns, and conflict dynamics (Brown, 2014; Burrows, Kinney, 2016; Abel *et al.*, 2019; Casano, 2024). There's another interesting emerging debate on resilience that focuses its attention on the western peripheral areas, mainly in those left-behind places described by Rodriguez-Pose (2018); in this case, the socio-economic dimension acquired relevance in the context of depopulation and ageing dynamics considering the perspective for heritage enhancement and tourism development (Graham *et al.*, 2016; Amore *et al.*, 2018; Pugh, Chandler, 2021; Chiocchini, 2023). In the meanwhile, the geographical debates on resilience enhancement and territorialisation intercept the multifaceted opportunities derived from new technologies applications in the field of mitigation, adaptation and preparedness, especially in the frame of climate change (Kniveton *et al.*, 2011; Henly-Shepard *et al.*, 2015; See *et al.*, 2016; Eckstein *et al.*, 2022).

In this perspective, there's three main context in which it could be relevant to focus reflections and practices related to these two processes (resilience and territorialisation): a) territorialisation processes and community resilience in the frame of climate-related socio-political phenomena, such as migrations and conflicts; b) the relationship between heritage, tourism and resilience in peripheral areas; c) the role and opportunities for the resilience of territories

offered by the new technologies. The articles hosted in this issue are strictly related to these three perspectives, even if they consider different points of view and apply different interpretative lenses. The main purpose of this collection is to bring to light the multifaceted declinations that research on resilience can take. The first section of this issue hosts contributions that rigorously and differentially address themes related to resilience and its declination at the territorial level through analyses and case studies from different contexts; the second section is dedicated to a focus on the Moroccan context with two complementary perspectives.

This editorial offers a general reflection on the relationship between community resilience and territorialisation, as well as some considerations on the dynamics that reconfigure the said relationship in a context traversed by climate-related socio-political phenomena, such as migrations and conflicts. It concludes with some general reasoning regarding all the themes dealt with in this issue.

### *Theoretical reflections on the relationship between community resilience and territorialisation*

According to Wilson (2012; 2013), resilience is not ‘made’ and does not emerge from a vacuum but is transferred through complex processes of policies and other exchanges between communities and society more generally. In addition to these dynamics, there are also those that link social action to space. Resilience, according to the same author, refers to preventive changes that see resilience as a desirable state, rather than simply a process of avoiding disruptions; this means that it is not just about reactive changes that simply respond to disruptions, but also a process linked to improved adaptive capacity that involves dynamic changes over time associated with learning and a willingness to take responsibility and control of development paths. Starting from the assumption that reflecting in terms of resilient territories and communities implies focusing on the programming and planning dimension, we intend to consider the complexity of social and political relations, but also – and above all – to intercept those processes that define the mutual iterations between community and territory over time. Generally speaking, it is necessary to focus attention on the ways in which communities act territorially, bringing to light the relations between the community itself and the environment, without neglecting the set of mechanisms that allow these relations to manifest themselves. In this regard, it is interesting to address the issue of the real functionality or otherwise of territorialising acts, or resilience strategies as you like, adopted within a given community in a given context. The resulting territorial and landscape transformation, on the one hand, allows for the

reduction of vulnerability to the impacts of external shocks for the community in question; on the other hand, it redefines in a more or less radical – and more or less positive – manner the territorial structure considered. This latter aspect is crucial for geographical analysis as it allows us to understand how aware there is of the impacts of human activities on the environment, how territorially rational the action is and to what extent the dynamic balance between environment and society is reconfigured. In more general terms, adopting such a perspective is fundamental to ‘sizing’ resilient action and distinguishing between coping strategies (functional in the short term) and resilience strategies (also functional in the medium to long term). Indeed, the literature emphasises that resilience is not right or has positive effects per sé (Adger *et al.*, 2011; Silva Villanueva, 2011; Wisner *et al.*, 2012; Béné, 2020; Behnassi *et al.*, 2022), but that it too has potentially counterproductive aspects, especially when considering different time and map scales. In fact, the spatial reconfigurations that occur in a given place also have significant repercussions in other contexts, both near and far; as well as, on time scales and with highly variable frequencies. Some of these reconfigurations may be temporary in nature, others quasi-permanent<sup>2</sup>. Community resilience can thus be observed and explained through processes of territorialisation, since it involves processes of reciprocal iteration between the physical environment and human actions, too. The analysis of these territorialising acts must remain the focus of attention, even when reasoning – as a geographer – in terms of resilience.

*Community resilience and territorialization in the frame of climate-related migration and conflict dynamics*

The potential correlation between migration, conflict, and climate change has been widely explored (Ide *et al.*, 2020; von Uexkull, Buhaug, 2021; Behnassi *et al.*, 2022)<sup>3</sup>. Nevertheless, it seems complex and somewhat unrealistic to think that it is possible to unambiguously define a broad causal relationship between these phenomena. Especially in light of the variability of circumstances and the highly context-related nature. Geographical, political, cultural, demographic, social, and economic variables play a decisive role that is often difficult to predict and assess. Several recent studies ascertained that the emergence of conflict and/or human mobility, in most cases, is determined by environmental factors in a secondary, complementary, or even residual way to other factors (Mach *et al.*, 2019; van Weezel, 2019; Linke, 2022; Augsten *et al.*, 2022). These aspects require the researcher to adopt a mixed ap-

<sup>2</sup> These are always dynamic states that only change dramatically under specific conditions.

<sup>3</sup> These are just some of the main references for the last five years.

proach, a strongly context-specific, place-based, and co-produced one (Cutter *et al.*, 2008). That's why it is fundamental, for example, to understand how to enhance community resilience at the local and collective levels in order to reduce the perturbances produced by the intricacies of phenomena like climate change, migration and conflict. In such contexts, characterized by unpredictability and complexity, community resilience-building activities should therefore address two objectives: reducing the reorganisation and learning time and mobilising new resources and knowledge (Casano, 2024). Resilience and territorialisation thinking may represent efficient means to understand how to deal with these new complexities and emergent challenges through a holistic approach (McLean *et al.*, 2014; Coetzee *et al.*, 2018; Matin *et al.*, 2018; Mayer, 2019). Community resilience incorporates the capacity of a social system to prevent and respond to more or less radical changes of an environmental and/or anthropic nature, characterised by a rapid or slow onset, by resorting to territorialising acts. It follows that the social system in question responds by activating and transforming its organisation, its adaptive capacities and its relations with the territory, without significantly altering community cohesion among its members. In other words, community resilience is the ability to prevent and respond by defining a new equilibrium (more or less similar to the previous one) in terms of the territorialisation process, reducing community and territorial exposure and vulnerability without compromising the main identity traits, and (re)structuring the interactions of that specific social system with itself, with the territory and with other human groups (Casano, 2024). This capacity is even more decisive – and at the same time problematic – when the communities and territories under consideration are immersed in the network of processes that more or less closely link climate dynamics, human mobility and conflict (Burrows, Kinney, 2016).

In these contexts, we believe that resilient communities need the development of: (1) skills and knowledge both at the level of the individuals that compose it and at the collective level; and (2) context-tailored rules, tools, practices, discourses and arrangements of infrastructural, environmental, political, economic, cultural and social nature (Casano, 2024). From an operationalisation perspective, we suggest deploying participatory mechanisms and bottom-up approaches (Schunk, 2018). Community resilience strategies need to focus on the local and the indigenous for their definition and implementation. Every process aimed at realising community resilience is closely associated with the functional deployment of resources and adaptive/transformational capacities, as well as the collective ratio that allows for variations within the institutions, cultural attitudes and goals of a specific community.

### *Overview of the main themes addressed by this issue*

The first group of scientific contributions collects articles inserted in the recent debate about inner and peripheral areas of Italy. Despite an often urban-centric view which has emphasised their isolation, vulnerabilities and underdevelopment, these areas are often rich in sustainable resources, including heritage, agriculture and tourism. This new awareness of the potential of such resources for peripheral areas has opened up a debate on the risks and opportunities of the heritagisation of territorial assets, which is strictly connected with resilience. In this sense, examples of good and bad practices may contribute significantly to the advancement of theoretical and applied analysis. The contributions in this sense host both theoretical and methodological suggestions about the link between tourism, heritagisation, agricultural activities and resilience in geographical studies at the local level; and case studies showing how local practices become engines of resilience.

The following scientific contribution is related to geo-technology and focuses on a Sudanese case study. The relevance of this perspective is certified by a vibrant scientific debate. In fact, geo-technology – along with bio and nano technologies – has been recognized as one of the three major fields shaping the development of science and society in the years to come. Furthermore, the achievement of territorial resilience goes hand in hand with technological progress and the application of new perspectives and methodologies in spatial assessments.

The final section of the issue, composed of two articles, is devoted to a glimpse into the Moroccan context by addressing some of the core challenges identified by the authors regarding resilience, climate change and migration.

### *Final remarks*

This issue hosts a series of contributions that aim at providing insights helpful to sustain the need to embrace an integrated geographic approach to resilience and territorial processes. It would be rooted in interdisciplinary connections, offering unique vantage points for uncovering spatial challenges and formulating resilient responses. Geographical methodologies can provide us with the conceptual, interpretive, and methodological tools which are required to delve into the core of problems and foster inclusive planning processes. Instead of crafting plans “for” the population, we strive to collaboratively formulate solutions “with” the community inhabiting the area, placing their needs and insights at the forefront.

Qualitative and quantitative research, technological development, ever-increasing computational capabilities, and free access to vast amounts of

constantly updated data are revolutionising geo-information. The ability to collect, store and analyse more and more data contributes to the development of effective tools to answer many urgent questions in the social and environmental domains. These innovations open up new scenarios in the study of the resilience of territories and communities.

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**Keywords:** Territorialisation, community resilience, heritagisation, geo-technology  
**Parole chiave:** Territorializzazione, community resilience, patrimonializzazione, geo-tecnologie

**SUMMARY** – Processes attributable to the enhancement of resilient practices in a community context incorporate and reshape forms of *territorialization*. It is relevant to consider these dynamics to understand climate-related socio-political phenomena, such as migrations and conflicts; as well as the relationship between heritage, tourism and resilience in peripheral areas. To achieve meaningful results it is fundamental to adopt a holistic perspective based on new geo-technologies and context-specific approaches.

**RIASSUNTO** – I processi riconducibili alla valorizzazione delle pratiche resilienti in un contesto comunitario incorporano e rimodellano forme di territorializzazione. È importante considerare queste dinamiche per comprendere i fenomeni socio-politici legati al clima, come migrazioni e conflitti, nonché il rapporto tra patrimonio, turismo e resilienza nelle aree periferiche. Per ottenere risultati significativi è fondamentale adottare una prospettiva olistica basata su nuove geotecnologie e approcci context-specific.

**RÉSUMÉ** – Les processus attribuables à l'amélioration des pratiques résilientes dans un contexte communautaire intègrent et remodelent les formes de territorialisation. Il est important de prendre en compte ces dynamiques pour comprendre les phénomènes sociopolitiques liés au climat, tels que les migrations et les conflits, ainsi que la relation entre le patrimoine, le tourisme et la résilience dans les zones périphériques. Pour obtenir des résultats significatifs, il est fondamental d'adopter une perspective holistique basée sur les nouvelles géotechnologies et des approches spécifiques au contexte.

**ZUSAMMENFASSUNG** – Prozesse, die auf die Verbesserung widerstandsfähiger Praktiken in einem Gemeinschaftskontext zurückzuführen sind, umfassen und verändern Formen der Territorialisierung. Es ist wichtig, diese Dynamik zu berücksichtigen, um klimabedingte soziopolitische Phänomene wie Migration und Konflikte sowie die Beziehung zwischen Kulturerbe, Tourismus und Resilienz in Randgebieten zu verstehen. Um aussagekräftige Ergebnisse zu erzielen, ist es von grundlegender Bedeutung, eine ganzheitliche Perspektive einzunehmen, die auf neuen Geotechnologien und kontextspezifischen Ansätzen beruht.

RESUMEN – Los procesos atribuibles a la mejora de las prácticas resilientes en un contexto comunitario incorporan y remodelan formas de territorialización. Es pertinente considerar estas dinámicas para comprender los fenómenos sociopolíticos relacionados con el clima, como las migraciones y los conflictos; así como la relación entre el patrimonio, el turismo y la resiliencia en las zonas periféricas. Para lograr resultados significativos es fundamental adoptar una perspectiva holística basada en las nuevas geotecnologías y en enfoques adaptados al contexto.



GIUSEPPE BIAZZO\*

Un'ipotesi di modello resiliente per alcune aree interne italiane: il caso studio dell'ecoturismo

*A resilient model hypothesis for some Italian Inner Areas: the ecotourism case study*

### *Introduzione*

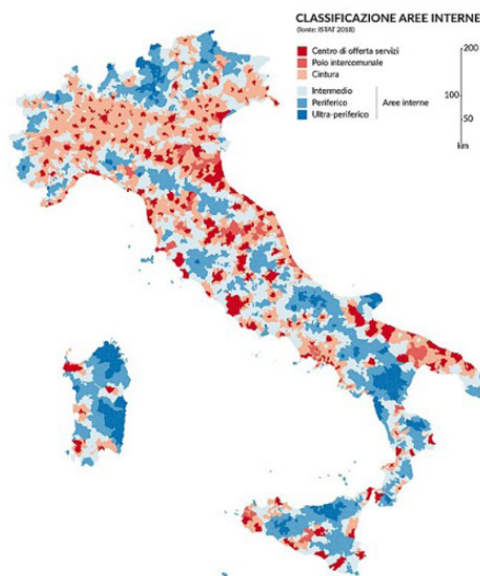
Tra le crisi emergenti, il cambiamento climatico e la pandemia di Covid 19 hanno inequivocabilmente avuto un impatto sulle popolazioni umane e sui territori concentrando pertanto l'attenzione della comunità scientifica e delle *policies* sul concetto di resilienza. Se il complesso quadro che pare profilarsi viene centrato sul piano locale, si determinano sfide sociali e ambientali altrettanto importanti, in quanto impattano su territori già fragili, nel nostro caso studio le aree interne italiane, così come definite nel 2013 dall'Agenzia per la Coesione Territoriale. Si osserva, infatti, che le aree interne italiane hanno fatto registrare una considerevole crescita di interesse turistico (AA. VV., 2022) e che a questo *trend* di crescita e di interesse corrisponde altresì un recupero dei flussi turistici più rapido rispetto alla media nazionale (Ceci *et al.*, 2023). Appare quindi necessario approfondire quale sia la traiettoria attraverso cui le aree interne italiane stanno implementando e gestendo le proprie strategie di sviluppo turistico e soprattutto se e quale turismo possa essere sostenibile per le stesse per evitare effetti speculari a quelli generati in passato nelle aree, oggi mature, dalla colonizzazione turistica esogena (Landini, 2018) oltre alle già note crisi di mete turistiche consolidate, riferibili al turismo urbano delle città d'arte (Visentin, Bertocchi, 2019).

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### *Aree interne in un quadro teorico e strategico*

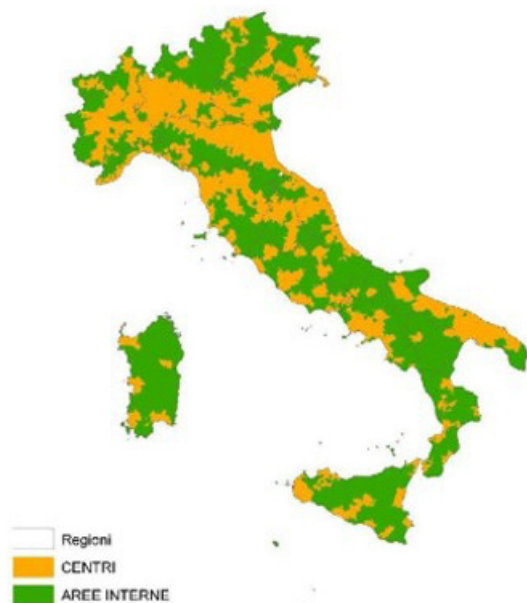
In relazione a questi rischi, quindi, prima di addentrarci nella relazione tra il turismo e le aree interne, sembra utile chiarire un importante aspetto teorico. Sotto il profilo geografico è il dominio fisico e naturale a renderle interne rispetto ad altri spazi (aree costiere, pianure, fondovalle), quando subentrano invece le attività umane e il peso che la *remoteness* (Sabatini, 2023) ha in relazione ai poli di attrazione, si passa al concetto di “aree periferiche”, dove appunto il luogo può essere considerato periferia solo rispetto a un centro (Cavuta, Ferrari, 2018). Pertanto la loro “perifericità” è contraddistinta, rispetto alle aree centrali, da alcune caratteristiche specifiche quali la distanza, intesa non solo in senso spaziale ma anche in senso figurato rispetto alle caratteristiche delle aree urbane, la loro associazione a parole come “rurale” o “selvaggia”, la debolezza dell’economia, l’emigrazione, la mancanza di controllo sui processi decisionali, ma anche alti valori estetici (Hall *et al.*, 2013). Queste caratteristiche, calate nella specificità del territorio italiano sono alla base dell’elaborazione della Strategia Nazionale per le Aree Interne e possono facilitare una migliore comprensione delle ragioni non solo socioeconomiche ma anche geo-storiche su cui nasce la strategia. I presupposti teorici per l’individuazione e la mappatura delle aree interne partono dalla considerazione che l’Italia è un paese caratterizzato da una rete di centri urbani estremamente fitta e variegata e questi centri, offrendo una rosa di servizi più o meno differenziati, sono in grado di generare importanti bacini di utenza e fungere da attrattori; il livello di perifericità dei territori rispetto ai centri urbani influenza la qualità della vita dei cittadini e l’inclusione sociale; le relazioni funzionali che si generano tra poli e territori periferici possono essere più o meno diversi (Barca *et al.*, 2014). La metodologia, quindi, dopo aver individuato i “centri offerta di servizi” (Polo e Polo intercomunale), li classifica (Fig.1 e Fig.2) in base alla loro perifericità e in forma aggregata (Cavallo, 2019). La SNAI può definirsi come un intervento nazionale di programmazione strategico-territoriale, che mira (Fig. 3) ad invertire le tendenze di spopolamento, invecchiamento demografico, impoverimento socioeconomico, abbandono delle attività rurali in atto in ampie aree del paese (Evangelista *et al.*, 2018) perseguendo gli obiettivi strategici attraverso la costruzione delle “precondizioni per lo sviluppo territoriale” con la previsione di interventi che adeguino l’offerta di beni e servizi che definiscono la cittadinanza (mobilità, salute ed istruzione) e la “promozione di progetti di sviluppo locale” in cui la valorizzazione delle risorse naturali, culturali e del turismo sostenibile rappresentano una delle direttrici per lo sviluppo territoriale nella programmazione. Altresì, la sostenibilità rappresenta un obiettivo trasversale a tutti gli interventi della SNAI ed in particolare importanza la tutela del territorio, dell’ambiente e programmazione turistica.

Fig. 1. La classificazione delle aree interne al 2018



Fonte: ISTAT, 2018. <<https://www.istat.it/sistema-informativo-6/atlane-statistico-dei-comuni-quarta-edizione/>>.

Fig. 2. Classificazione dei comuni in forma aggregata secondo i criteri dell'Agenzia per la Coesione Territoriale



Fonte: Cavallo (2019).

Fig. 3. Obiettivi Strategici della SNAI



Fonte: Barca *et al.* (2014).

### *Aree interne e turismo un binomio complesso*

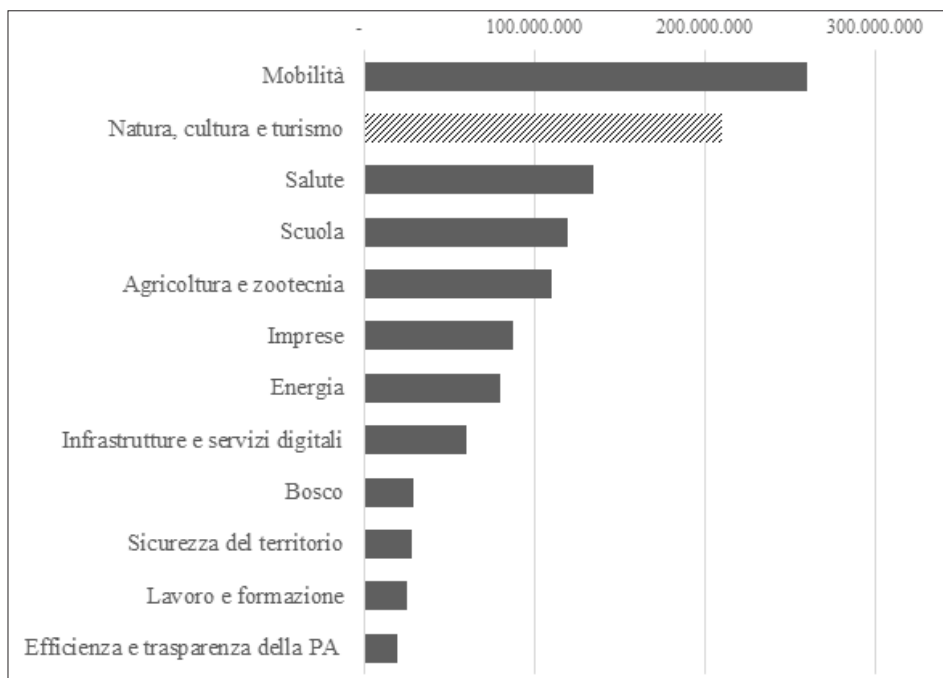
Questa nuova prospettiva di studi che concentra l'attenzione sul turismo e la sostenibilità valutando l'impatto sulle comunità e il territorio, quindi, pone sotto osservazione non più solamente il fruitore turista ma anche il territorio con tutti i beni materiali e immateriali. In Italia, dal secondo dopoguerra, l'intenso processo di industrializzazione ha creato una forte crescita economica che, dal punto di vista territoriale, si è dimostrata "diffusa" e "polarizzata", consegnando una vasta porzione del territorio montano e collinare alla decrescita economica e demografica (Barca *et al.*, 2014). La conseguente marginalizzazione di queste aree, quindi, la de-antropizzazione dei loro spazi naturali, l'indebolimento dei legami sociali, la perdita di valori e identità culturale sono aspetti chiave del fenomeno del loro impoverimento (Cotella, Brovarone, 2022). In questo contesto, facendo riferimento anche al settore turistico, le aree interne e rurali, in cui il "peso della componente rurale" connota molte di esse (Petino, 2020), hanno perso gradualmente il loro valore come luoghi di produzione ed in esse è prevalsa l'attrattività come luoghi di consumo per il turismo e il tempo libero (Cotella, Brovarone, 2022). L'aumento di attrazione verso le aree interne può esporle, tuttavia, a dei paradossi, se, da un lato, contribuisce al miglioramento ed incremento delle infrastrutture turistiche aumentando il benessere delle popolazioni locali, dall'altro, l'aumento incontrollato di turisti può diventare eccessivo se calato nel contesto di questi territori fragili, creando sovraffollamento in alcuni periodi dell'anno,



periodi di inattività prolungata ed anche un progressivo allontanamento delle comunità locali dalle decisioni in merito allo sviluppo del territorio. L'industrializzazione del turismo ha indotto studiosi ed operatori a considerare la comunità locale, ed aggiungiamo il patrimonio territoriale, come risorse del prodotto di consumo e divertimento da vendere (Cavuta, Ferrari, 2023). In questo scenario, agli effetti negativi che il turismo può produrre nelle aree interne si aggiunge un ulteriore paradosso relativamente agli stress generati dalla pandemia di COVID19 e dal cambiamento climatico. Nonostante, infatti, la pandemia COVID19 abbia esacerbato le sfide e le criticità a cui queste aree erano già sottoposte, come la più alta esposizione a malattie gravi a causa dell'elevato indice di vecchiaia e del limitato accesso ai servizi sanitari (Cotella, Brovarone, 2022), dall'altro lato, le aree interne hanno dimostrato una maggiore crescita di interesse turistico ed un conseguente e più veloce recupero dei flussi turistici rispetto ad altre aree del paese (AA. VV., 2022). Pertanto, in questo scenario, il paradigma da esplorare nelle aree interne diventa la resilienza, intesa come la capacità di risposta del sostrato socioeconomico locale alle sollecitazioni provenienti dall'espansione del fenomeno turistico (Ferrari *et al.*, 2017). Con riferimento alla SNAI, nonostante il turismo non rappresenti l'unico obiettivo di sviluppo territoriale per le aree periferiche, esso è senz'altro una strada potenziale per valorizzarne il capitale territoriale (Ferrari, 2018), sono, infatti, numerosi ed eterogenei i territori che hanno individuato nel turismo il proprio – unico o prevalente – focus strategico (Evangelista *et al.*, 2018). Tra le 72 aree progetto selezionate nella programmazione 2014-2020, il turismo è presente nella progettazione in 45 aree e, riguardo all'allocazione finanziaria complessiva per ambito di intervento, il capitolo natura-cultura-turismo è collocato al secondo posto in termini di risorse finanziate solo dietro alla mobilità (Fig. 4), a tal proposito, analizzando queste voci di spesa, sarebbe opportuno approfondire se, ad esempio, gli investimenti sulla mobilità siano funzionali a migliorare l'accesso “ai servizi che definiscono la cittadinanza” degli abitanti di queste aree, oppure siano, in relazione agli investimenti sul turismo, connessi a migliorare l'accesso dei visitatori in questi territori.

Tra queste aree progetto, 13 aree hanno deciso di sviluppare le politiche turistiche in gestione associata (AA. VV., 2022) puntando nel turismo come principale leva per lo sviluppo territoriale. Il turismo, tuttavia, può essere una componente importante dello sviluppo delle aree interne ma a determinate condizioni che, oltre ai pericoli derivanti dagli impatti, tengano conto: dell'attrattività turistica degli stessi, dell'integrazione del turismo con le altre azioni della strategia d'area, delle competenze degli attori locali, della *governance* e della gestione, di una pianificazione degli interventi che coinvolga anche la popolazione e gli attori presenti nel territorio. In questa direzione muovono

Fig. 4. Allocazione finanziaria complessiva per ambito di intervento della SNAI



Fonte: Ceci *et al.* (2023, p. 421).

le linee guida fornite dal Ministero per i beni e le attività culturali e per il turismo (MIBACT, 2016) finalizzate all'integrazione del turismo nella SNAI. Il quadro che emerge nell'ambito delle strategie di sviluppo turistico delle aree progetto in ambito SNAI risulta molto complesso e differenziato: se infatti solo 21 aree, tutte nel Centro-Nord con l'eccezione di due aree in Puglia, sono considerate come grandi e medi attrattori turistici, non può dirsi lo stesso per il resto delle aree interne, soprattutto le aree montane marginali, con un potenziale turistico assai limitato. Invero, indipendentemente dall'attrattività turistica, quasi tutte le aree interne presentano degli attrattori importanti quali: naturalistici, culturali ed enogastronomici (Fig. 5).

Lo straordinario valore che viene dato alla biodiversità, alle specificità culturali e alle specialità enogastronomiche nell'ambito della SNAI in associazione allo sviluppo turistico di questi territori, orientato al mercato in un'ottica di sostenibilità, può essere associato al turismo ambientale e naturalistico, o *nature based tourism* (Montanari, 2009), il quale si focalizza anche sul contatto con i luoghi e la popolazione locale.

Fig. 5. Comuni italiani per presenza di attrattore turistico



Fonte: ISTAT, in Cavallo (2019).

### *L'ecoturismo: un modello resiliente per il turismo delle aree interne*

In questo quadro orientato, secondo la visione strategica della SNAI, alla sostenibilità del turismo, è quindi lecito chiedersi quale forma di turismo possa coniugare l'esigenza di mitigare gli impatti sull'ambiente e sostenere lo sviluppo del territorio delle aree interne in un contesto di resilienza generato dalla decrescita demografica ed economica, amplificato dagli stress dovuti al cambiamento climatico ed alla pandemia di COVID-19. Inoltre, sarebbe altrettanto opportuno interrogarsi su quale modello di turismo possa essere praticabile e adattabile a tutte le aree interne o solamente ad alcune di esse. L'Ecoturismo, al contrario di altre forme di turismo, può essere più adeguato a conservare le risorse socio-culturali e naturali di un territorio (Montanari, 2009), infatti, così come definito dalla International Ecotourism Society: «un viaggio responsabile verso aree naturali che preservi l'ambiente, sostenga il benessere della popolazione locale e coinvolga l'interpretazione e la formazione» (TIES, 2015), sono messi in evidenza i tre pilastri dell'ecoturismo quali: conservazione dell'ambiente naturale, benessere delle comunità locali ed interpretazione e formazione rivolta sia alle comunità stesse sia ai turisti. Stando a questa definizione, l'ecoturismo, proprio in virtù dei principi su cui si fonda, può, a pieno titolo, rappresentare un'opportunità per i territori e per le comunità abitanti, poiché implementa, attraverso la sua pratica, il benessere economico delle stesse e ne preserva l'ambiente, presupponendo la partecipazione attiva del turista, fruitore consapevole dei problemi dei sistemi ambientali, rispetto alla tutela dei territori, contribuendo positivamente alle condizioni ecologiche, economiche e sociali dei luoghi di destinazione, contrariamente a quanto avviene con il turismo di massa (Montanari, 2009). Nel caso specifico delle aree interne italiane,

basandosi su questi principi, l'ecoturismo risulterebbe aderente alle premesse che costituiscono la base teorica della SNAI. L'ecoturismo nelle aree interne potrebbe essere sviluppato facendo leva su attrattori turistici specifici come quelli naturalistici, culturali e di certificazione e tutela del territorio, (Cavallo, 2019) comprese le specialities (Petino, 2020) eno-gastronomiche. Come emerge dalla Figura 6, ad esempio, tutti gli attrattori naturalistici, culturali e quelli legati alla certificazione e tutela del territorio sono coincidenti con le aree progetto della SNAI, nella quasi totalità delle quali è presente una pianificazione turistica. Questo certamente non significa che l'ecoturismo possa essere adatto a tutte le aree progetto della strategia, tuttavia, facendo riferimento alla classificazione tipologica di Lozato-Giotart (2018) sugli spazi turistici interni, potrebbe svilupparsi una strategia su due livelli basata sull'ecoturismo negli spazi di "Tipo interno profondo in ambiente di montagna", aree poco popolate e di difficile accesso in cui spesso sono presenti parchi e riserve naturali, coincidenti con le aree italiane ultra-periferiche, ricche di attrattori naturalistici, estendibile, come secondo livello, anche alle altre aree periferiche ricche di attrattori naturalistici legati alla certificazione e tutela dei territori a vocazione turistica per ridurre gli eventuali impatti negativi. L'ecoturismo tuttavia, non è scevro da limiti: è opportuno chiedersi, come suggerito da Butler (1989) se questa nuova tipologia di turismo possa rappresentare "un cavallo di Troia" per consumare e rendere banali nuove risorse turistiche o, piuttosto, se il sovraffollamento turistico sul lungo periodo, anche nella pratica ecoturistica, comporti un impatto sull'ambiente dei territori e sulle popolazioni locali dovuto oltre che alla fruizione dei territori anche ai mezzi di mobilità, ai trasporti ed alle finalità speculative di alcuni operatori turistici. Come sottolinea Montanari (2009), una possibile soluzione è stata teorizzata da Weaver (2002) che identifica i criteri che demarcano le differenze tra un modello di "ecoturismo debole" ed un modello di "ecoturismo forte" (Fig. 6), stabilendo come "l'ecoturismo debole", per alcune sue caratteristiche, potrebbe essere meno dannoso per l'ambiente e per le comunità coinvolte, in quanto prevede la concentrazione dei visitatori in aree di ridotta dimensione, minimizzando gli spazi interessati dalla loro presenza, concentrando la massa degli utenti in aree dove è più facile introdurre misure lenitive dell'impatto ed, infine, garantisce una migliore gestione delle visite e dei visitatori.

Pur sottolineando doverosamente i limiti dello sviluppo dell'ecoturismo nell'ambito delle aree progetto della SNAI, per potere dirsi compiuta, la strategia dell'ecoturismo non può fare a meno della comunità. L'ecoturismo, per sua stessa definizione, si basa sul sostegno e il benessere della popolazione locale (*ibidem*) non solo da parte del turista ma anche con la partecipazione attiva della comunità locale, quindi, è altrettanto necessario che la consultazione, il coinvolgimento, la partecipazione e l'*empowerment* delle comunità locali

diventino cruciali nella pianificazione turistica, determinando un allargamento della compagine decisionale e la sperimentazione di nuove modalità collaborative tra *policy makers* tradizionali ed emergenti, con tutte le potenzialità e nonostante i limiti degli approcci partecipativi, nelle aree fragili (Evangelista, 2018) e rappresentino un elemento fondamentale soprattutto in quelle aree progetto in cui si dovrebbe implementare l’ecoturismo. Pertanto, l’ecoturismo su base comunitaria (*Community Based Eco Tourism*) può essere un metodo di mitigazione dei suoi stessi limiti, perché oltre a tutelare l’ambiente diventa anche un modo per responsabilizzare le comunità, consentendo loro un certo grado di controllo sui progetti turistici ed il loro impatto, inoltre, se facciamo riferimento alla sostenibilità in quanto pilastro della SNAI, il CBET si basa su tre elementi principali dello sviluppo sostenibile: efficienza economica, equità sociale e sostenibilità ecologica (Fiorello, Bo, 2014).

Fig. 6. L’ecoturismo nella sua tipologia ideale, dal modello forte al modello debole

| FORTE                              | DEBOLE                                                 |
|------------------------------------|--------------------------------------------------------|
| <<<Spettro eco turistico >>>       |                                                        |
| Impegno ambientale forte           | Impegno ambientale superficiale                        |
| Visite finalizzare                 | Visite con molti obiettivi                             |
| Escursioni lunghe                  | Escursioni corte                                       |
| Piccoli gruppi                     | Gruppi numerosi                                        |
| Fisicamente attivi                 | Fisicamente passivi                                    |
| Sfida fisica                       | Confort fisico                                         |
| Servizi pochi o inattesi           | Servizi attesi                                         |
| Interazione profonda con la natura | Interazione superficiale con la natura                 |
| Evidenza alla esperienza personale | Evidenza alla interpretazione                          |
| Organizzazione del proprio viaggio | Dipendenza da agenzia di viaggio e operatori turistici |

Fonte: rielaborazione da Weaver (2002).

*L’ecoturismo come potenziale nelle aree progetto Madonie e Ascoli Piceno*

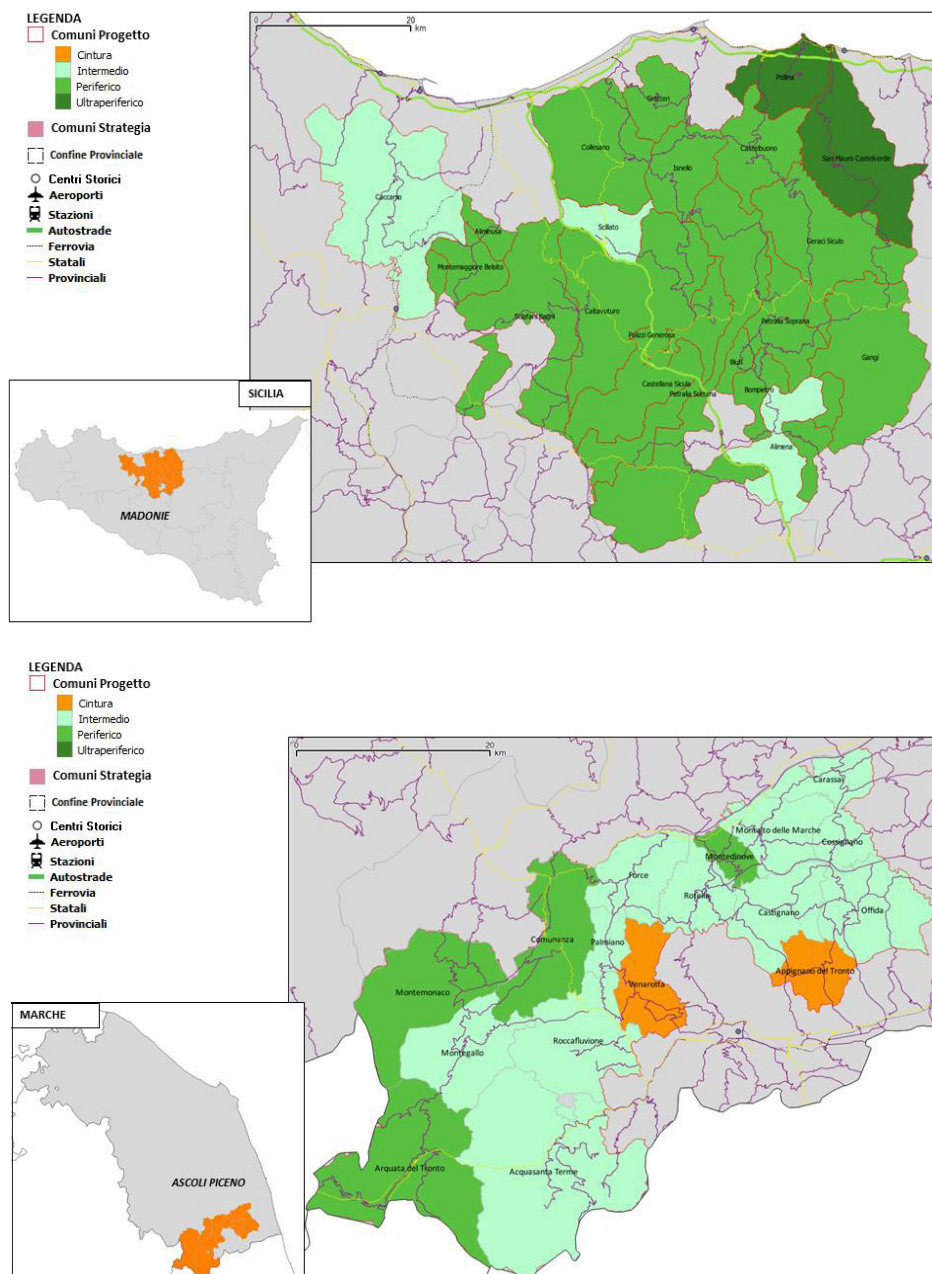
Nel presente lavoro si analizzano due casi studio, tra le aree progetto, che hanno considerato il turismo come focus strategico per implementare le politiche di sviluppo territoriale nell’ambito della SNAI. La metodologia utilizzata si basa sull’analisi documentale delle rispettive strategie d’area, individuando inoltre la perifericità turistica (Cavallo, 2019), la presenza di attrattori turi-

stici nei rispettivi territori, l'esistenza di una pianificazione strategica vocata all'ecoturismo e infine, le eventuali potenzialità di sviluppo di una strategia fondata sul metodo dell'ecoturismo su base comunitaria. Le aree progetto prese in esame sono l'area interna Madonie in Sicilia e l'area interna Ascoli Piceno nella regione Marche, nella dimensione territoriale che assumono nella programmazione 2014-2020. Secondo la classificazione su cui fa leva la SNAI, le due aree oggetto di studio presentano una sostanziale differenza: se l'area di Ascoli Piceno può essere classificata come un'area prevalentemente intermedia, l'area delle Madonie invece presenta caratteri più marcati di perifericità (Fig. 7).

La classificazione per perifericità turistica delle due aree risulta invece abbastanza omogenea, infatti, entrambe possono essere definite periferie turistiche a "turisticità" (Cavallo, 2019) media (Fig. 8). Entrambe le aree interne possiedono attrattori turistici di pregio con particolare riferimento a quelli naturalistici e legati alla certificazione e tutela del territorio compresa l'enogastronomia. Nell'area interna delle Madonie possiamo infatti annoverare la quasi totale sovrapposizione dell'area al Parco Regionale delle Madonie, inserito nel 2015 nella lista globale dei geo parchi e considerato sito UNESCO, di tre «borghi più belli d'Italia e di tre *specialities* legate all'enogastronomia oltre a numerosi presidi *Slow Food*» (Strategia d'Area, p.8). Su alcuni comuni dell'area interna di Ascoli Piceno si estende, invece, parte del Parco Nazionale dei Monti Sibillini e, oltre ad un "borgo più bello d'Italia", si contano cinque *specialities* legate all'enogastronomia e presidi *Slow Food*. La ricchezza di biodiversità legata al paesaggio naturale ed alle produzioni relative alle *specialities* enogastronomiche fa sì che in queste aree siano presenti attrattori coerenti all'ecoturismo anche se bisognerebbe confrontarli alla presenza di attrattori legati alla ricettività turistica e infrastrutturale compatibili alla pratica dell'ecoturismo stesso. In entrambe le strategie, tuttavia, non è dedicata una pianificazione specifica dell'ecoturismo, nonostante le premesse siano compatibili al suo sviluppo in misura più o meno simile. L'area delle Madonie fa riferimento allo sviluppo e al potenziamento di un turismo esperienziale e relazionale legato all'identità dei luoghi, ad un turismo "integrato", naturalistico, sportivo, culturale, religioso che "lungo i sentieri" interagisca con le produzioni agricole tradizionali del territorio (Strategia d'area Madonie pp. 14-27). L'area di Ascoli Piceno propone una strategia di sviluppo turistico territoriale basata su una puntuale divisione in *cluster* delle aree focus che si coniughi con una serie di interventi sui fattori di processo e di sistema, quali comunicazione, marketing territoriale, ricettività, itinerari e servizi di supporto (Strategia d'area Ascoli Piceno, p. 38) e di queste aree che sono considerate il focus dello sviluppo turistico dell'area di particolare interesse, nel nostro caso, sono gli interventi nell'ambito dell'*outdoor* dove si prevedono azioni mirate nell'ambito degli itinerari religiosi, itinerari natura-acqua, bike, in alcuni

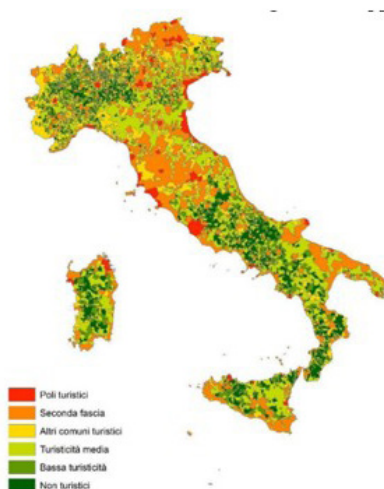


Fig.7. Aree Progetto Madonie e Ascoli Piceno con comuni per classificazione di perifericità



Fonte: Agenzia per la Coesione Territoriale (2014), <<https://www.agenziacoesione.gov.it/strategia-nazionale-aree-interne/regione-marche-aree-interne/ascoli-piceno/>>; <<https://www.agenziacoesione.gov.it/strategia-nazionale-aree-interne/regione-sicilia/madonie/>>.

Fig. 8. Classificazione dei Comuni Italiani per perifericità turistica



Fonte: ISTAT, in Cavallo (2019).

comuni, integrate nel contesto del Parco Nazionale dei Monti Sibillini (Strategia d'area Ascoli Piceno, pp. 39-42) e queste azioni previste, supportate da interventi progettuali, non sembrano tutte coerenti con la sostenibilità della strategia e ancor più con l'ecoturismo. Di fronte all'assenza dell'ecoturismo in entrambe le visioni strategiche di sviluppo turistico, non può emergere contestualmente nessuna strategia di sviluppo dell'ecoturismo su base comunitaria.

### *Conclusioni*

Considerati quindi sia i casi studio, sia il contesto complessivo delle aree interne, seppur l'ecoturismo risulterebbe aderente alle premesse che costituiscono la base teorica della SNAI, risulta evidente come non venga fatta rispetto ad esso menzione alcuna. Nonostante le aree interne siano compatibili alla pratica dell'ecoturismo grazie ai numerosi attrattori legati alla natura e biodiversità, al patrimonio correlato alla tutela del territorio ed enogastronomia, nelle strategie si fa riferimento piuttosto ad altre forme di turismo sostenibile e questa sua assenza nella pianificazione delle strategie d'area sembra emergere in quanto non tengono conto delle differenze con le altre forme di turismo "alternativo". Rimane aperta la questione per cui la loro fragilità, amplificata



dagli stress del cambiamento climatico e della pressione turistica sull'ambiente, il territorio e le popolazioni locali, pone l'attenzione sulla resilienza, come conseguenza della perifericità delle aree interne, in un contesto in cui possiamo sottolineare come il binomio "aree fragili e sviluppo turistico" non sia automaticamente efficace, in quanto la ricchezza di capitale territoriale, anche nel nostro caso, non presuppone necessariamente una traiettoria vincente, da intendersi in riferimento ad una pianificazione dello sviluppo turistico fine a se stessa (Evangelista, 2018). Altresì, i rischi che possono derivare da una visione industriale del turismo di massa, in cui la comunità ha un ruolo marginale, possono costituire un'ulteriore corrosione del già fragile tessuto socioeconomico delle aree interne (Landini, 2018). L'ecoturismo, quindi, può senz'altro rappresentare una risposta settoriale resiliente anche di fronte a questi limiti ed essere in contrasto alla marginalizzazione territoriale ed al declino demografico delle aree interne italiane ed ai potenziali impatti del turismo, perché costruisce un patto di comunità che valorizza l'ambiente naturale, culturale, le identità locali ed il turista ne è parte attiva, e questo potrebbe essere il caso delle due aree prese in esame nel presente lavoro. Certamente, seppure la presenza di attrattori compatibili all'ecoturismo siano fondamentali per il suo sviluppo, questo potrebbe non essere sufficiente, in quanto l'ecoturismo può essere adatto ad alcune aree interne che mostrano equilibri eco-sistemici e demografici più fragili, tipici delle aree periferiche ed ultra-periferiche, in cui l'impatto del turismo e di investimenti infrastrutturali possono essere contrastanti. In questo scenario sembra altresì auspicabile che una strategia per lo sviluppo dell'ecoturismo nelle aree interne possa svilupparsi su "base comunitaria", CBET (cfr. *supra*), in quanto può essere uno strumento inclusivo per le comunità locali sotto il profilo dell'efficienza economica, dell'equità sociale e della sostenibilità ecologica, obiettivi perfettamente coerenti con i principi della SNAI.

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*Keywords:* resilience, inner areas, ecotourism

*Parole chiave:* resilienza, aree interne, ecoturismo

**ABSTRACT** – The impact of emerging crises makes it necessary to readjust also in relation to geographical space through new perspectives. Locally, in our case study, Italy's inland areas, fragile and marginal territories, are at the center of a growing interest in tourism, which may represent an opportunity, but under what conditions if it can also represent a risk in terms of impact on the environment and local populations? The aim of this research was to assess the development potential of ecotourism by providing an observation on two case studies.

**RÉSUMÉ** – L'impact des crises émergentes rend nécessaire un réajustement de l'espace géographique à travers de nouvelles perspectives. Localement, dans notre étude de cas, les zones intérieures de l'Italie, territoires fragiles et marginaux, sont au centre d'un intérêt croissant pour le tourisme, qui peut représenter une opportunité, mais à quelles conditions s'il peut aussi représenter un risque en termes d'impact sur l'environnement et les populations locales ? L'objectif de cette recherche était d'évaluer le potentiel de développement de l'écotourisme en fournissant une observation sur deux études de cas.

**ZUSAMMENFASSUNG** – Die Auswirkungen der sich abzeichnenden Krisen machen eine Neuausrichtung auch in Bezug auf den geografischen Raum durch neue Perspektiven erforderlich. Auf lokaler Ebene stehen in unserer Fallstudie die Binnengebiete Italiens, fragile und marginale Gebiete, im Mittelpunkt eines wachsenden Interesses am Tourismus, der eine Chance darstellen kann, aber unter welchen Bedingungen kann er auch ein Risiko in Bezug auf die Auswirkungen auf die Umwelt und die lokale Bevölkerung darstellen?

**RESUMEN** – El impacto de las crisis emergentes hace necesario un reajuste también en relación con el espacio geográfico a través de nuevas perspectivas. A nivel local, en nuestro caso de estudio, las zonas del interior de Italia, territorios frágiles y marginales, son el centro de un creciente interés por el turismo, que puede representar una oportunidad, pero ¿en qué condiciones si también puede representar un riesgo en términos de impacto sobre el medio ambiente y las poblaciones locales? El objetivo de esta investigación era evaluar el potencial de desarrollo del ecoturismo mediante la observación de dos casos prácticos.



MATTEO DI GIOVANNI, GIACOMO CAVUTA\*

Community resilience, potential or cause of marginalisation of inland areas?<sup>1</sup>

*Resilienza comunitaria, potenzialità o causa di marginalizzazione delle aree interne?*

### *Introduction*

Italy has been experiencing a land management crisis for a long time. Over time, various problems have arisen that enrich the mosaic of territorial imbalances and offer increasing degrees of marginalisation (Lanzani, Curci, 2018). Modern research focuses on the breakdown of the hegemonic and supportive relationship between the centres and peripheral realities (Chiocchini, Mantuano, 2022). Traditionally, the centres have played the role of leaders with directional functions of the entire geographical area, legitimised by the availability of essential services and their attitude as centralisers of economic activities and urban users. The accentuation of physical, but also cultural, economic and social distances has increased the crisis, creating a kind of internal division within the territories themselves. On the one hand, there are the central areas, led by the Poles with the role of driving force, but limited to their own reference area and providers of essential services (Carlucci, Lucatelli, 2013). On the other hand, there are the more disadvantaged places in the hinterland, with a limited connection to the centres and a very poor provision of essential services for urban and community development (Meloni, 2021). This scenario gives rise to asymmetries of territorial opportunities, with urban agglomera-

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<sup>1</sup> Authors’ contributions: Please note that this paper represents the work of a common research project. However, PhD Student Matteo Di Giovanni wrote sections: 1. Territorial organisation in Italy and the problem of “inner areas”, 2. SNAI, 3. Community Cooperatives, 4. Multifunctional agriculture. While Professor Giacomo Cavuta wrote section: 5. Tourism transition. Both authors read and approved the final manuscript.

tions giving services to their own communities, as they are no longer able to generate cross-border benefits. The external localities suffer from distance, which leaves them outside the development patterns and condemns them to physical isolation and backwardness in terms of services (Lino *et al.*, 2022).

The debate on “inner areas” was further intensified by the Covid-19 pandemic, an event that accentuated the physical and conceptual distances between areas (*ibidem*). The result is, on the one hand, the degrading conditions of urban and social deprivation that afflict peripheral areas (De Rossi, Mascino, 2020) and, on the other hand, the excessive concentration of settlement and infrastructure policies in saturated urban centres.

### *Territorial organisation in Italy and the problem of “inner areas”*

«Why has Italy, over the years, increasingly manifested problems related to internal areas?». According to the Darwinian concept of the State, the geographical determinism of a country or territory justifies its underdeveloped state. This concept is also accepted by the French writer Jean Poncet, although he refers to Third World countries in much more extreme conditions. However, if we want to limit the field of observation to a less extensive area, we could also find a certain correspondence with the question of the Italian hinterland. In fact, they suffer essentially the same fate, which is not linked to natural factors, because they are well endowed with resources, but to socio-economic conditions (Poncet, 1968). Status of backwardness due to the community's inability to efficiently exploit local endogenous resources in accordance with modern evolutionary dynamics (such as a rural reality adopting a model dedicated to industrialisation) and, therefore, to adapt to new standards of living. Italy identifies itself as a polycentric territory, with a system of urban centres dense with services essential to human life (education, health and transport) and therefore defined as major centralisers of urban, economic and tourist users (Carlucci, Lucatelli, 2013). However, the reticular organisation of the poles is contrasted by areas with spatial remoteness, creating a scenario in which, paradoxically, connections between urban centres, even in different regions, are easy, but between poles and inner areas of the same region are difficult (Cerutti *et al.*, 2024). The process of rural marginalisation that has intensified since the 1950s, driven by intense phenomena of de-anthropisation and by the progressive qualitative and quantitative reduction in the local supply of public, private and collective services. The natural consequence could only be the gradual depopulation of the so-called “inner areas” by young people, for lack of valid prospects for cultural and employment growth. Today, 60% of the national territory is made up of marginal areas.

Considering the following Table 1, it collects data on the resident population of Italian municipalities to compare the concentration of people between the areas closest to the urban centres and the hinterland.

Tab. 1. Resident population in Italian municipalities

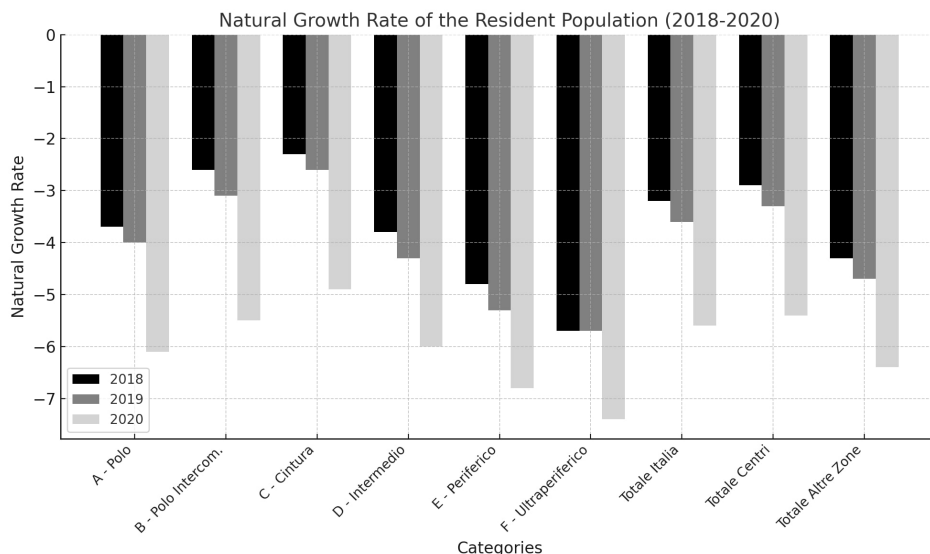
| Classification<br>Municipalities | Population<br>2001 | Population<br>2020 | Pop. Forecast<br>2030 | % Change<br>2020-2001 | % Change<br>2030-2020 |
|----------------------------------|--------------------|--------------------|-----------------------|-----------------------|-----------------------|
| A-Pole                           | 19.910.965         | 20.470.301         | 20.236.114            | 2,8                   | -1,1                  |
| B-Intercommunal pole             | 1.530.449          | 1.576.586          | 1.532.265             | 3                     | -2,8                  |
| C-Belt                           | 21.925.417         | 23.756.465         | 23.316.015            | 8,4                   | -1,9                  |
| D-Intermediate                   | 7.955.510          | 8.059.454          | 7.783.513             | 1,3                   | -3,4                  |
| E-Peripheral                     | 4.881.374          | 4.653.355          | 4.410.659             | -4,7                  | -5,2                  |
| F-Ultra-peripheral               | 792.029            | 720.052            | 676.432               | -9,1                  | -6,1                  |
| Total Population Italy           | 56.995.744         | 59.236.213         | 57.954.998            | 3,9                   | -2,2                  |
| Centres (A+B+C)                  | 43.366.831         | 45.803.352         | 45.084.394            | 5,6                   | -1,6                  |
| Inner Areas (D+E+F)              | 13.628.913         | 13.432.861         | 12.870.604            | -1,4                  | -4,2                  |

Source: Chiocchini, Mantuano (2022).

Despite the overall positive demographic trend between 2001 and 2020 (+3.9%), the two main groups of municipalities (centre and hinterland) do not show the same growth. Central municipalities benefited from a population increase of 5.6%, while peripheral municipalities suffered an overall decrease of 1.4%. Presumably, people left the inner areas and moved closer to municipalities offering more services. The only exception was the intermediate area, which did not suffer any decline between 2001-2020 and even benefited from an increase in citizens.

The demographic trends up to 2030 are different. The passage of time will be unfavourable for all agglomerations. In fact, each of the residential areas will suffer a population decline, for a total reduction of 2.2% (-1.6% for the centres, -4.2% for the internal areas) (Chiocchini, Mantuano, 2022).

Fig. 1. Natural growth rate of the resident population



Source: Chiocchini, Mantuano (2022).

It shows the natural demographic decline of the areas considered, with obvious mirroring. This is also explained by the natural social dynamics in which the number of births is lower than the number of deaths. As can be logically imagined, the natural growth rate in absolute terms, or the decline rate, is higher in the inner areas. The same trend can be observed when looking at the individual area classifications. Thus, even places with efficient life-supporting services are not exempt from the natural decline, which is accentuated from generation to generation, as the following images shows, Fig. 1.

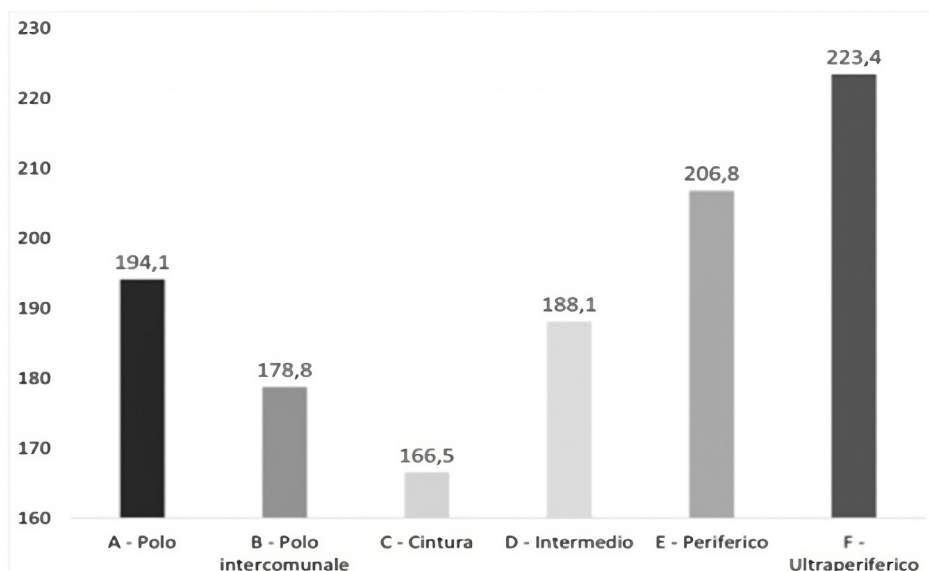
While Figure 2 illustrates the exodus of young people from the periphery and the consequent concentration of the elderly population.

Once again, it is the peripheral and ultra-peripheral regions that carry the banner of the old-age index, with more than 200 elderly people for every young person. The only exception is the intermediate zone.

The apparent fragility of rural areas due to their disadvantaged location can also be read as an abundance of important environmental resources (forests, protected areas, agricultural and agri-food production) and cultural resources (archaeological heritage, abbeys, small museums, craft centres). However, demographic changes, have led to a change in the use and destination of land and a reduction in its protection. In fact, over the last thirty years there has been a decline in the UAA (Utilised Agricultural Area), as reported in Table 2.



Fig. 2. Old age index



Source: Bianchino *et al.* (2022).

Despite the impoverishment of agriculture and the resulting social costs that affect the community, marginalised localities (especially in the south), in accordance with their physical and spatial characteristics, rely on the primary sector as a strong and distinctive element of their economy compared to urban centres. Strengthening the internal demographic structure is therefore a prelude to rural regeneration and development plans (in the face of economic, social and territorial deprivation).

Tab. 2. Total UAA (hectares)

| Year | No. of farms | Utilised Agricultural Area | Total Agricultural Area |
|------|--------------|----------------------------|-------------------------|
| 2020 | 1.133.023    | 12.535                     | 16.474                  |
| 2010 | 1.615.590    | 12.856                     | 17.081                  |
| 2000 | 2.393.161    | 13.182                     | 18.767                  |

Source: Authors' elaboration.

## SNAI

Considering the territorial imbalances, in 2013 the Agency for Territorial Cohesion defined a strategy dedicated to the development of the “inner areas” and the cohesion of the country, the National Strategy for Inland Areas - SNAI (Meloni, 2021). As also underlined by the XVI Rapporto SGI (Cerutti *et al.*, 2024), the project gives national relevance to the problem of territorial marginality and promotes a place-based policy to adopt new forms of multi-level local governance to support geographically and demographically disadvantaged areas (Barca, 2009). It has two types of targets. The national objectives are to increase employment, re-use untapped territorial capital and reduce social costs. While the local objectives are to create and increase the well-being of the residents; to restore and consolidate the economic and social vitality of the community (Carlucci, Lucatelli, 2013). The purpose of this distinction is to specify the context of intervention and not to give an order of execution, as there is the constraint of simultaneous pursuit through the interaction of the two levels mentioned.

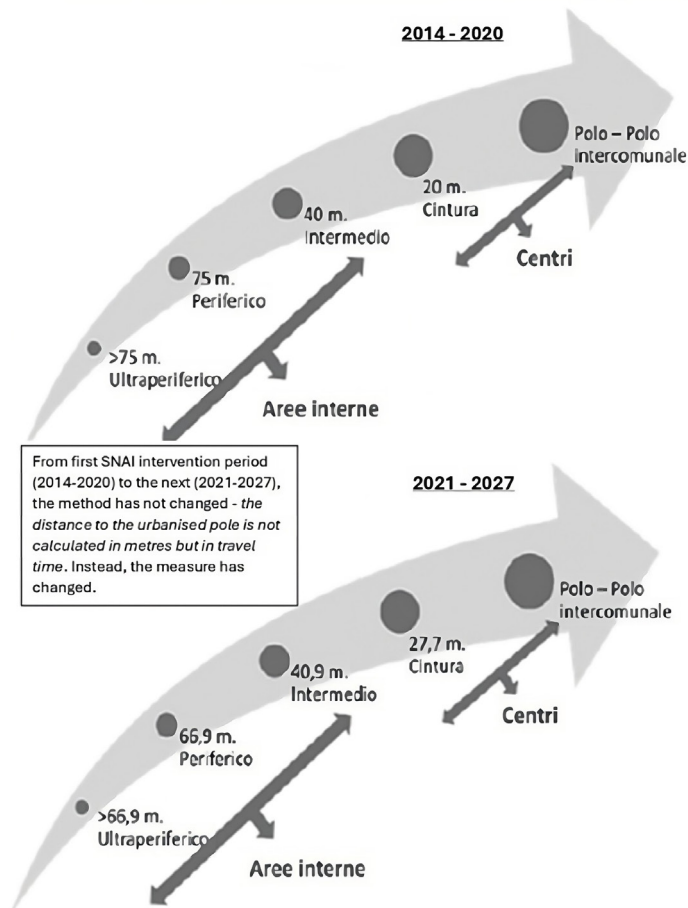
Given the purpose, i.e. the re-qualification of the internal areas and territorial cohesion, and the tools, i.e. the profitable use of the rural heritage and the functional relations between the poles and the peripheries, it is necessary to define the solid foundations of the SNAI (Barca *et al.*, 2014). The first step is to identify the demand for these development processes. Obviously, it varies according to the characteristics of the area, since each one offers different inputs to the strategy, i.e. lifestyle and human relations, territorial heritage and environmental conditions, natural and cultural resources, agri-food systems and energy sources, such as offering specific and typical products to the public (Magnaghi, 2000). In this strategy, the well-known marginal and peripheral realities are conceived as rural areas subject to strong centrifugal forces, demographic decline, migration, abandonment of land use and management, natural hazards, isolation, poor accessibility to services and infrastructure, and economic marginalisation.

The strategy also went beyond the traditional opposition between cities and rural peripheries, moving beyond the debate of the contrast between the two and promoting the idea of giving a new centrality to territories, affirming their identity, stressing the importance of territorial policies that guarantee at least access to basic services, and introducing place-based territorial management planning, where the point of observation is not “from the centre to the periphery” but from the periphery itself (Barca *et al.*, 2014). This is «a purely localist vision that places formal and informal institutions, expressive local community groups and stakeholders at the centre of the system» (Rodriguez-Pose, 2020). Obviously, such planning is aimed at the interior, as areas suffering from spatial marginality and socio-economic malaise, but the underlying

concept is spatially flexible. Therefore, to overcome the spatial divide, policies for the reactivation of marginal areas must not be aimed exclusively at the interior.

Since the introduction of the SNAI, two Italian territorial classifications have been presented for the two programming periods 2014-2020 and 2021-2027 to identify inland areas. Both classifications are presented in Figure 3.

Fig. 3. Classification of Inner Areas in the 2014-2020 and 2021-2027 programming periods



Source: Bianchino *et al.* (2022).

### *Community Cooperatives*

An effective and efficient tool for organising and upgrading the local offer should not ask itself what it can bring to the periphery to revitalise it but should change its approach and answer the question: «How can I use the endogenous resources in such a way as to express the full potential of the inner areas?». The best cards in the hand of peripheral communities are certainly a solid local identity, architectural and environmental quality, an enviable endowment of natural resources and the availability of social and territorial capital. These are all important factors in offering unique products and satisfying consumer needs in today's highly demanding market (Lancaster, 1966). In a certain sense, the beneficiaries of services are given more power, as if they were involved in territorial regeneration projects. It is precisely the endogenous endowment of resources that makes it possible to experiment with participatory approaches to rural welfare strategies (added value for residents and stakeholders). In this way, the SNAI does not only propose internal conservation and valorisation measures (perhaps for tourism purposes) but works from the perspective of territorial organisation to allow autonomous sustainable development and greater interaction between centre and periphery.

The State's commitment does not always succeed in fully satisfying local interests, in relation to the minimum level of governance, which is why the strategy reserves the power to intervene directly to the community actors, in the form of a specific organisation, the well-known Community Cooperative (Urso, 2021). After all, who knows the problems and strengths of the area better than the inhabitants themselves. The result of direct civic action is self-sufficiency. This is a condition that the hinterland must "master", as it has been forced to do over the years by the traditional socio-economic asymmetries *vis-à-vis* the centres (Lanzani, Curci, 2018). In a sense, self-sufficiency has always fostered rural realities that are remote and sometimes hermetic from contact with urbanised realities. A scenario that is no longer sustainable today, for the sake of the peripheral localities themselves, which are increasingly alienated from the metropolitan system. This is why, in addition to useful initiatives aimed at the individual community, we recognise the need to adopt models of settlement that break down the age-old contrast between centres and peripheries. Conceptually and culturally, there are still differences between the metropolis and the hinterland, but the essence of the strategy is not to implant the identity of one in the other, but to establish relationships of interdependence and cooperation (Meloni, 2016).

Openness to bottom-up management and organisational systems is facilitated by increased public awareness of land protection, energy efficiency and

local heritage conservation. In this sense, citizens demand to be involved in the development processes of their area to best meet their specific needs.

However, self-management of spaces is not sufficient to create value on a large scale, and close cooperation between public and private interventions is needed (Urso, 2021).

### *Multifunctional agriculture*

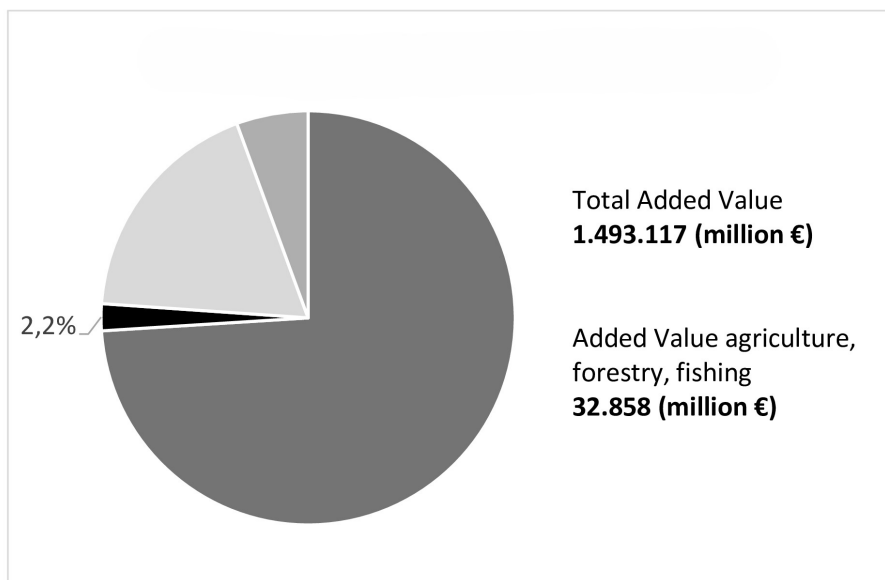
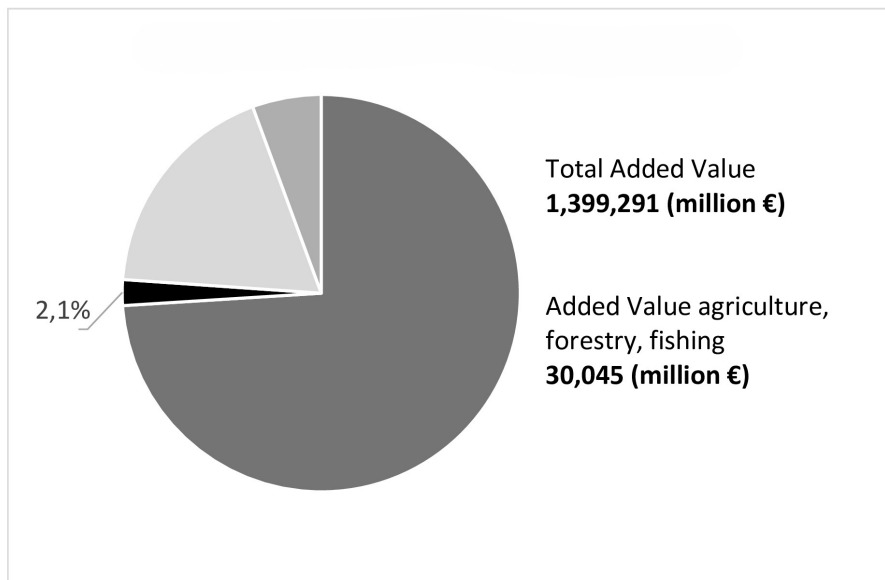
The ability of a community to withstand adversity and still sustain healthy growth through collective and effective work towards a common goal, better known as community resilience, is a fitting definition of what Community Cooperatives represent. This spirit of adaptation and innovation is also associated with one of the centuries-old defining factors of inland areas, agriculture. Despite the unfavourable reduction of its centrality in production systems, its resilient character has prevailed against the overwhelming pressure of sectoral development and the process of territorial polarisation, preserving its useful contribution to life. In fact, several community cooperatives base their programmes on it, thus promoting the growth of agricultural activity over time, as shown in Table 3.

Tab. 3. Added value of agricultural production (planning comparison)

| Economic Activities                           | Million € (current values) |           |           |
|-----------------------------------------------|----------------------------|-----------|-----------|
|                                               | 2012/2013                  | 2019/2020 | 2022/2023 |
| Herbaceous crops                              | 14.193                     | 15.037    | 19.598    |
| Arboreal/woody crops                          | 1.710                      | 12.726    | 2.408     |
| Forage crops                                  | 11.827                     | 1.700     | 14.982    |
| Livestock breeding                            | 17.557                     | 16.016    | 20.870    |
| Agricultural support activities               | 6.665                      | 6.796     | 7.628     |
| Production of agricultural goods and services | 51.952                     | 52.275    | 65.486    |
| (+) Secondary activities                      | 1.583                      | 4.399     | 6.164     |
| (-) Secondary activities                      | -                          | 933       | 1.260     |
| Agricultural production                       | 53.535                     | 55.741    | 70.390    |
| Intermediate consumption                      | 25.029                     | 25.727    | 35.961    |
| Added value of agriculture                    | 28.506                     | 30.014    | 34.429    |

Source: Authors' revision of INEA (2014) and CREA (2021) data.

Fig. 4. % added value of agriculture, forestry, fishing 2013 e 2020



Source: Authors' elaboration of INEA 2014 data and CREA 2021 data.

Of course, in today's market dynamics and in the light of public awareness of sustainability issues, agriculture must not be reduced to the concept of an industrial enterprise dedicated to maximum profit, obtained by intensive soil depletion without the slightest regard for the protection of the ecosystem. The intention remains to preserve ancient cultivation techniques, as a historical and cultural heritage, but in combination with modern and experimental approaches, to adapt the original productive function to territorial and social changes, and to respond to the new needs of the local community, first, and the national market, later. This paves the way for the concept of multifunctional agriculture (Meloni, 2015), which goes beyond the "enclosure" of the mere production of primary goods, broadening its vision to include the role of service provider to create added value for the community. We are therefore moving from a scenario in which local operators, driven by the desire for wealth and personal well-being, intensively exploit the land to increase productivity and specialise in certain activities in order to be more competitive on the local market, to one in which the driving force is respect for the land, diversification of the goods and services offered and cooperation to achieve external mutuality and sustainable development. Considering multifunctionality, three strategies can be adopted:

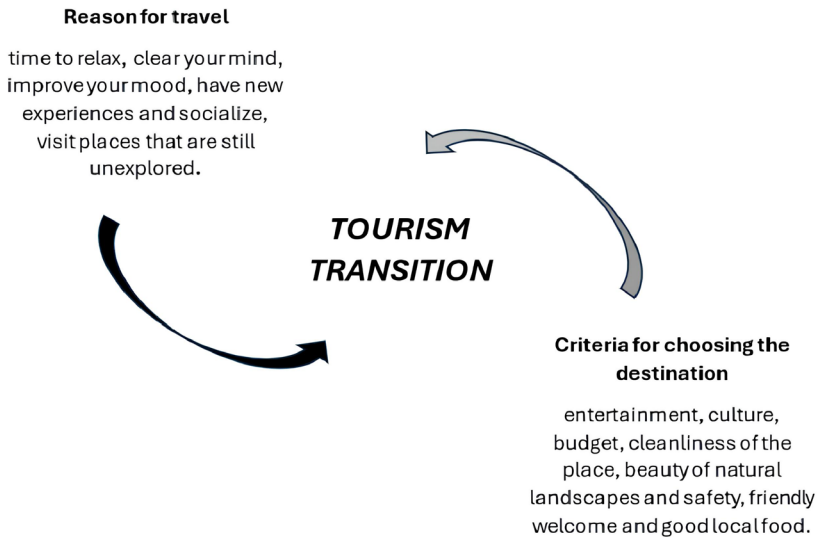
1. Deepening, i.e. practices deepening and improve agricultural production.
2. Broadening, aimed at bringing together practices broadening the traditional functions of agricultural enterprises.
3. Regrouping, aimed at redistributing the factors of production outside the farm.

The application of these strategies makes it possible to produce results that can generate positive transversal externalities. This trend is demonstrated by the increase in the value added of agriculture, fishing and forestry activities before and after the introduction of the first SNAI programming period, respectively in Figure 4.

### *Tourism transition*

As already mentioned, the strong territorial polarisation reflects a great concentration of services in urban centres and the installation of the main economic activities. As a result, the history of tourism tells of the large influx of visitors to these places with their important artistic, cultural, historical and monumental heritage; the natural consequence was the concentration of accommodation facilities in these top tourist destinations. In recent years, however, this trend has been reversed due to new holiday motives, which have led

Fig. 5. Tourism Transition



Source: Authors' elaboration.

to a reduction in mass tourism, resulting in a kind of “tourism transition” (Salvatore, Chiodo, 2016), as indicated in Figure 5.

The reorganisation and the new attractive offer on the territory made “rural tourism” a functional tool for the implementation of SNAI (Meini *et al.*, 2017). The suburbs were given the opportunity to turn their locational disadvantages into a potential, as they were perfectly adapted to the new demands of travellers, in contrast to the urban centres, which were unable to offer a new competitive offer in line with the new standards (Salvatore, Chiodo, 2016; Cerutti *et al.*, 2024). The new tourism potential for inland areas is represented by the graph of activities that these areas can offer to visitors, in Figure 6.

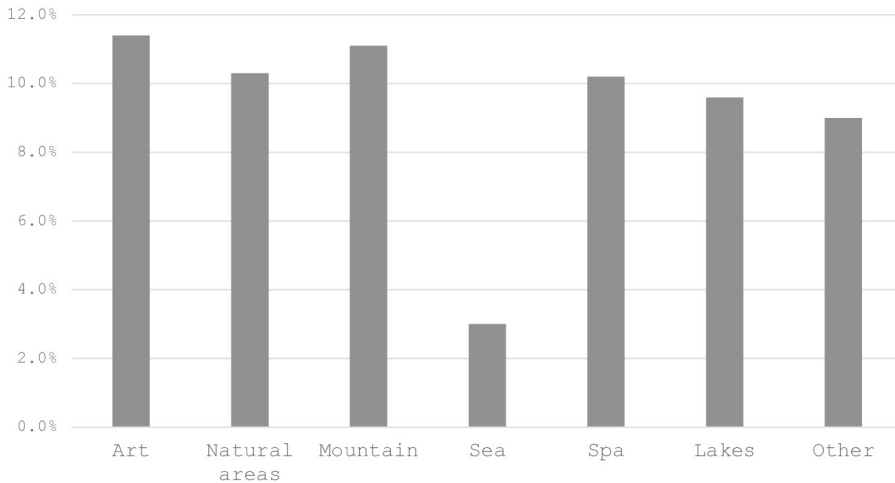
The identity characteristics of the area, reduced traffic, distance from the hectic dynamics of the city and greater contact with nature, once the “cross” of these inland areas, are now the “delight” of the new rural development paradigm. They give an impetus to the attractiveness of the periphery, attracting the attention of tourist flows and opening the possibility of setting up facilities offering quality services (Meloni, 2021).

The aim of the interventions is not to reverse the socio-economic influence of the poles, but to promote the development of the places, the population and the tourism sector to achieve “territorial equity”<sup>2</sup> (Barca, 2009). It is

<sup>2</sup> The principle of giving areas (inner or central) equal opportunities for economic and social



Fig. 6. Type of tourist product



Source: Authors' elaboration on Chiocchini, Mantuano (2022) data.

therefore necessary to define a concrete rural development programme based on the following essential factors:

1. The human factor: probably the most important feature of an effective growth programme. The actors involved in the decision-making processes of development projects (Magnaghi, 2000).
2. The use value: taking an under-utilised local element and returning it to the community with a proper value and a new use value (Barca, 2009).
3. Experiential: works on the emotional sphere of the tourist and reinforces the focus on the needs and well-being of visitors (Pine, Gilmore, 1999).

Consequently, two ways can be followed for valid tourism governance. The first proposes territorial integration between tourist destinations and localities that lack the strength and scale to do so. The second creates synergy between tourism and other directly or indirectly related sectors (Meloni, 2021).

For tourism purposes, both the landscape characteristics and the cultural and attractive vocation are very important (Magnaghi, 2000). A clear classification of the inland areas' municipalities based on their actual or potential tourist vocation is provided by the Table 4.

Meanwhile, the evolution of the same marginal and non-marginal places in terms of the presence of tourists over the years is shown in Table 5.

growth, regardless of their level of development.

Tab. 4. Population by main tourist category and classification of inner areas (%) 2020

| Main Tourist Category                                                                           | Centres | Inner Areas | D- Intermed. | E-Peripheral | F-Ultra-Peripheral |
|-------------------------------------------------------------------------------------------------|---------|-------------|--------------|--------------|--------------------|
| Large cities (with multidimensional tourism)                                                    | 19.7    | 0.0         | 0.0          | 0.0          | 0.0                |
| Municipalities with historical, artistic, cultural and landscape vocation                       | 13.6    | 7.8         | 7.6          | 8.8          | 3.4                |
| Municipalities with a maritime vocation                                                         | 5.8     | 12.9        | 11.9         | 15.3         | 7.8                |
| Lake tourism municipalities                                                                     | 1.1     | 1.5         | 1.8          | 1.1          | 0.9                |
| Municipalities with a mountain vocation                                                         | 0.4     | 4.3         | 2.5          | 6.3          | 10.2               |
| Municipalities of thermal tourism                                                               | 0.6     | 0.6         | 0.6          | 0.7          | 0.0                |
| Municipalities with a maritime and historical, artistic, cultural and landscape vocation        | 10.1    | 8.2         | 7.7          | 7.2          | 20.9               |
| Municipalities with a mountain and historical, artistic, cultural and landscape vocation        | 0.3     | 4.2         | 1.6          | 6.4          | 19.9               |
| Municipalities with a historical, artistic, cultural and landscape vocation and other vocations | 2.4     | 2.8         | 2.2          | 3.8          | 2.0                |
| Other tourist municipalities with two vocations                                                 | 0.4     | 0.5         | 0.3          | 0.9          | 0.7                |
| Tourist municipalities not belonging to a specific category                                     | 40.1    | 48.1        | 54.3         | 40.8         | 25.0               |
| Non-tourist municipalities                                                                      | 5.3     | 9.1         | 9.3          | 8.8          | 9.1                |
| TOTAL                                                                                           | 100.0   | 100.0       | 100.0        | 100.0        | 100.0              |

Source: Chiocchini, Mantuano (2022, p. 11).

Tab. 5. Comparison of total tourist presences

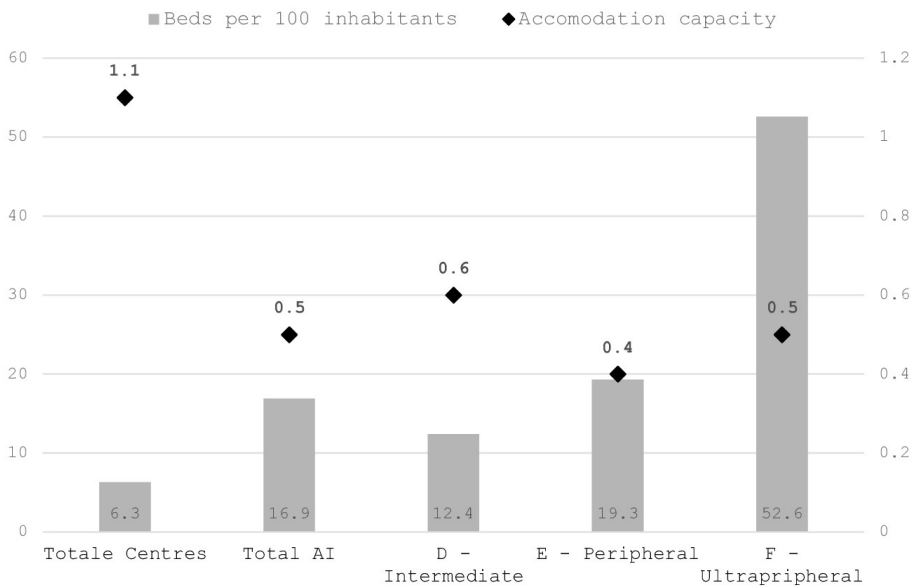
| Year | Tourist presences |                 |
|------|-------------------|-----------------|
|      | Inner Areas       | Non-Inner Areas |
| 2019 | 37.5%             | 62.4%           |
| 2020 | 44.7%             | 55.3%           |
| 2021 | 41.1%             | 58.9%           |

Fonte: Zaccomer, Bertocchi (2022, p. 78).

Finally, the innate tourist vocation expressed in the form of the geographical location of municipalities must be accompanied by an adequate number of accommodation facilities and the efficient management of services directly and indirectly related to the tourism sector (Chiocchini, Mantuano, 2022).

Figure 7 is a graphical representation of the density of accommodation facilities, i.e. the number of buildings used to accommodate tourists, and the accommodation capacity, i.e. the availability of beds in the accommodation. As the data show, there is an inverse relationship between the number of establishments and their accommodation capacity. In fact, the density of establishments is higher in the centres than in the periphery. However, inland areas have a greater accommodation capacity and could attract more tourist flows if this tourism potential were accompanied by efficient management of services and geographical space.

Fig. 7. Density of accommodation facilities and accommodation capacity in Inner Areas (values per 100 inhabitants and per km<sup>2</sup>)



Source: Chiocchini, Mantuano (2022, p.12).

## Conclusions

In conclusion, the context of the Inner Areas proves to be fertile and with a strong potential for innovation, in need of effective and efficient project programmes to accompany these localities towards a renaissance and, even more importantly, to a solid development of the country. Strategic national and local programmes are indeed committed to a “healing” approach in favour of geographically, culturally and economically disadvantaged small rural areas. Of course, this is not a rapid process (still in action), and it is not yet showing the desired results, since in several inner areas the situation of distress persists.

The combination of national/supranational initiatives and the planning capacity of local actors is desirable to implement effective policies and promote territorial cohesion. In fact, where the state fails, the direct intervention of the community is functional. They will logically have a greater interest in improving their territory and will therefore be able to propose regeneration programmes that better meet the needs of the local population.

Today’s experience does not provide definitive results, but it does open the possibility and, above all, the need for constant monitoring and analysis of resources, expressed and unexpressed potential and growth opportunities linked to territorial interventions. Now, we are not at the starting point, since a first phase of interventions has already been completed, but the goal has not yet been reached. The issue of the “inner areas” is far from being resolved, and it is one that lends itself to long-term territorial analyses and policies.

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**Keywords:** territorial resilience, sustainable development strategies, inner areas, agriculture activities, tourism transition

**Parole chiave:** resilienza territoriale, strategie di sviluppo sostenibile, aree interne, attività agricole, transizione turistica

**ABSTRACT** – Inner Areas have limited access to essential services and untapped development potential. Italy's proposal for rural regeneration is the National Strategy for Inner Areas. The article investigates the critical territorial issues; the SNAI classification and the endogenous resources part of the unexpressed potential. The analysis shows how community resilience leads to a reduction in social deprivation and, consequently, to the regeneration of marginalised areas.

**RIASSUNTO** – Le Aree Interne hanno limitato accesso ai servizi essenziali e potenziale di sviluppo inutilizzato. La proposta italiana alla riqualificazione rurale è la Strategia Nazionale Aree Interne. L'articolo indagherà le criticità territoriali; la classificazione SNAI e le endogene risorse parte del potenziale inespresso. L'analisi mostra come la resilienza della comunità porti a una riduzione del disagio sociale e, di conseguenza, alla rigenerazione delle aree emarginate.

**RÉSUMÉ** – Les zones intérieures ont un accès limité aux services essentiels et un potentiel de développement inexploité. L'Italie a proposé une stratégie de régénération rurale: la «Stratégie nationale pour les zones intérieures». L'article examine les questions territoriales cruciales, la classification SNAI et les ressources endogènes qui font partie du potentiel inexprimé. L'analyse montre comment la résilience des communautés réduit la privation sociale et, par conséquent, régénère les zones marginalisées.

**ZUSAMMENFASSUNG** – Die Gebiete im Landesinneren haben einen eingeschränkten Zugang zu wichtigen Dienstleistungen und ein ungenutztes Entwicklungspotenzial. Italiens Vorschlag für die Erneuerung des ländlichen Raums ist die „Nationale Strategie für die inneren Gebiete“. Der Artikel untersucht die kritischen territorialen Fragen, die SNAI-Klassifizierung und die endogenen Ressourcen, die Teil des ungenutzten Potenzials sind. Die Analyse zeigt, wie die Widerstandsfähigkeit der Gemeinschaft zu einer Verringerung der sozialen Benachteiligung und somit zur Regeneration marginalisierter Gebiete führt.

**RESUMEN** – Las zonas del interior tienen un acceso limitado a los servicios esenciales y un potencial de desarrollo sin explotar. La propuesta italiana para la regeneración rural es la «Estrategia Nacional de Zonas Interiores». El artículo investigará las cuestiones territoriales críticas, la clasificación SNAI y los recursos endógenos como parte del potencial no explotado. El análisis muestra cómo la resiliencia comunitaria conduce a una reducción de la privación social y, en consecuencia, a la regeneración de las zonas marginadas.

FABRIZIO FERRARI\*, LAURA AUGELLO\*\*

Tourism, resilience, and sustainability transitions in rural areas: a multi-level perspective

*Turismo, resilienza e transizioni sostenibili nelle aree rurali: una prospettiva multi-livello*

### *Introduction*

Tourism has long been regarded as a straightforward economic activity, with a focus on leisure activities for tourists and profit maximisation for entrepreneurs. However, the study of tourism is increasingly being recognised as a subject that must be developed in an organic and systemic way, taking into account the development paths over time and all the actors involved at the different levels.

In recent years, the paradigm of Evolutionary Economic Geography (EEG) has demonstrated efficacy in the analysis of the spatialities of economic novelty. In this line of enquiry, a few key concepts have emerged in relation to the evolution of territorial economic systems (Martin, Sunley, 2015): the robustness or resilience, the plasticity and the emergency.

These concepts can be usefully embedded in a geographical analysis of the sustainability transitions agenda in tourism systems, taking into account various complex factors, namely environmental, socio-cultural, and economic stratifications (Köhler *et al.*, 2019).

Although an analysis through a multi-level perspective (MLP) is recognised as a promising approach to understanding the complex relationships between the actors involved in the socio-technical dynamics (Niewiadomski, Brouder, 2022), it requires further development of the existing architecture to account for the specific characteristics of tourism systems.

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The main purpose of this paper is to initiate a theoretical discourse that allows the conceptual framework of the multi-level perspective to be integrated with more precisely delineated territorial considerations on the interactions between agricultural and tourism systems, in accordance with the models put forth by the EEG.

Italian rural areas are typically distinguished by a discernible decline in population and a reduction in productive activities. The development of tourism has the potential to become a significant driver of economic and social development, offering new pathways for the revitalisation of marginalised areas. In this regard, the investigation of the evolution of tourism systems in Italian rural areas represents a compelling case study for the application of EEG theories and the multi-level perspective.

The present study aims to investigate two case studies. The first focuses on Trentino, where concerns pertaining to overtourism and the potential impact of a single-season winter (threatened by an increasingly marked scarcity of natural snow due to climate change) have been addressed through the implementation of sustainable agricultural practices, inextricably linked to local culture and society. In this regard, the three Flavour Routes of Trentino are of particular interest. The second case study concerns the emergence of new community and bottom-up practices in the field of oleotourism in Puglia, also in response to the significant challenges posed by the plant infection with *Xylella*, which has had a detrimental impact on both production and the region's image.

### *Theoretical Framework*

It is not feasible to provide a comprehensive account of the theoretical advancements pertaining to EEG theories in this contribution. Consequently, only a few key ideas will be focused.

The concepts of path dependence and path plasticity represent fundamental elements within this theoretical framework.

As posited by Martin and Sunley (2006), there are three main and inter-related versions of path dependence. The first proposes a technological lock-in, which is particularly prevalent in specific areas of activity. The second entails dynamic increasing returns, whereby various externalities and learning mechanisms operate to produce positive feedback effects, thereby reinforcing existing development paths. The third is about institutional hysteresis, which refers to the tendency for formal and informal institutions, social arrangements and cultural forms to reproduce themselves over time.

Path creation will inevitably entail a complex combination of deliberate action and accidental and unintentional emergence (Martin, Sunley, 2010).



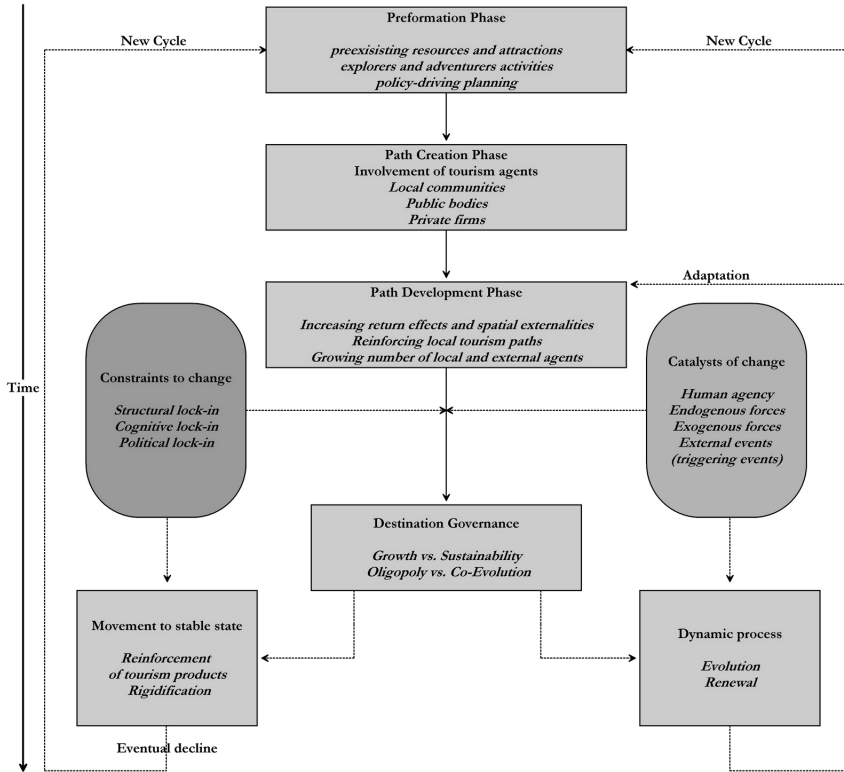
As deliberate and intentional activity, agents may seek out opportunities as the basis of new growth, or alternatively, they may intervene to disrupt existing paths or overcome lock-ins. In contrast, unintentional emergence, accidents and events may serve to trigger the creation of new paths or unforeseen external shocks, while chance events can interrupt existing paths and create new ones.

Garud and Karnøe (2003) identify two main categories of strategies for creating new paths. Bricolage strategies are distinguished by the considerable creativity of the actors involved, who devise innovative combinations of resources, thereby co-shaping the emerging technological path. A breakthrough strategy represents a significant divergence from established pathways, characterised by the utilisation of novel resources and a substantial shift away from the conventional trajectory of economic and technological advancement.

In the field of tourism systems, Ma and Hassink (2012) have put forth a model comprising five evolutionary stages. The model is particularly intriguing in the subsequent phase, given that the authors posit the possibility of two alternative paths that actors may choose to pursue. The initial phase entails the reinforcement of the existing system. This enables the exploitation of the acquired expertise, and the visibility attained in the markets, allowing actors to focus exclusively on adaptive activities, which can be defined as bricolage, and to embark on a path dependence trajectory. The potential consequences of such a decision are low flexibility, lack of adaptability and difficulty to withstand external shocks and market fluctuations. The alternative path is characterised by a radical departure from the current situation, focusing on experimentation and introduction of new products. This approach is designed to enhance breakthrough strategies and facilitate adaptive path plasticity. The risk is a deficiency in the requisite knowledge and innovative skills to tackle new and probably unknown markets.

Gill and Williams (2017) highlight the existence of opposing forces that influence the tourist system's trajectory, either towards path dependency or the creation of new paths. Factors that contribute to the system's tendency to remain anchored to the current path include the phenomena of structural, cognitive, and political lock-ins. However, there are also external and internal forces that can alter the current equilibrium over time and create new developmental pathways under the influence of planned actions or external triggering events. The interplay of path-dependence and path-creation forces shapes the character of governance systems and the nature of the overall path constitution. It is essential that tourism planning and governance measures strike a balance between the growth requirements of socio-economic systems and the necessity to implement environmentally, demographically and economically sustainable actions, a balance which is subject to change over time.

Fig. 1. A theoretical path development model



Source: Own elaboration based on Ma, Hassink (2012) and Gill, Williams (2017).

The occurrence of unforeseen events and shocks that result in a deviation from the planned development trajectory are opposed by the resilience capacity of the system. The concept of resilience can be understood in three different ways (Martin, Sunley, 2015). Resilient territories are regions that have the capacity to recover from shocks and return to their pre-shock state or trajectory (i.e. the ability to bounce back), or are able to absorb various economic shifts, environmental changes and social disruptions (i.e. the ability to stay stable), or, lastly, exhibit positive adaptive capacity in anticipation of, or in response to, shocks (i.e. the ability to bounce forward).

By integrating these theoretical models, it is possible to construct a conceptual framework (Fig. 1) which illustrates the evolutionary paths that have been traced over time. This framework emphasises the continuous dilemma between stability and flexibility.

The evolutionary dynamics of tourism systems require the conceptual framework of the multi-level perspective (MLP) to properly delineate their paths and trajectories, which encompass actions and events at different levels.

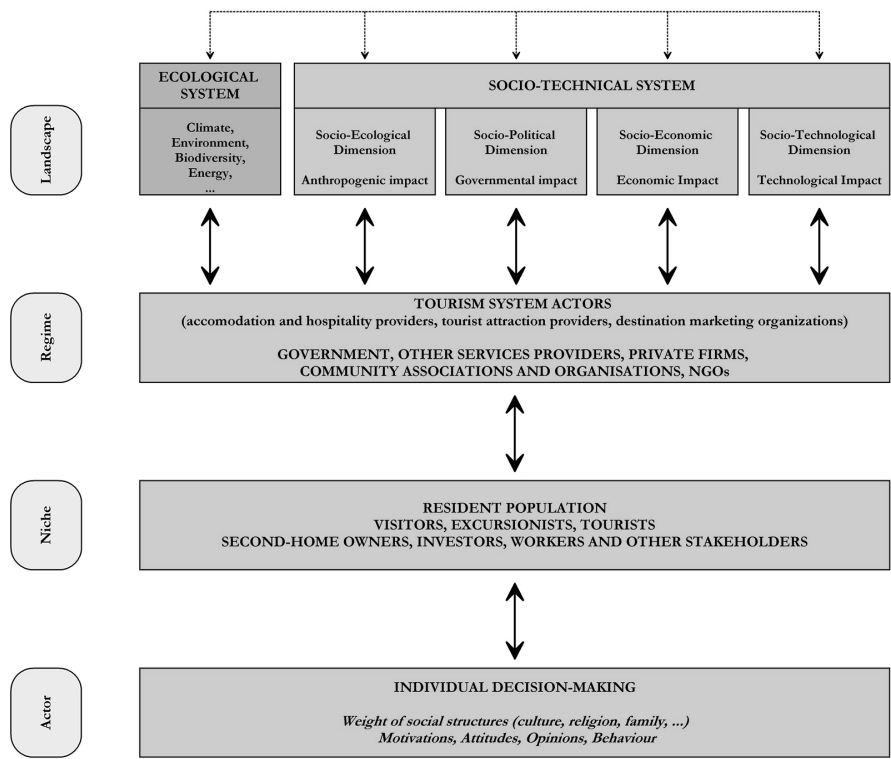
The initial theories regarding the MLP (Geels, 2002) demonstrated a pronounced configuration of the role of technology, approaching an excessive linearity of development. Geels and Verhees (2011) expanded the cultural dimension of the MLP by drawing on insights from cultural sociology, discourse theory, and social movement theory. Moreover, the incorporation of the geographical dimension (Coenen *et al.*, 2012; Hansen, Coenen, 2015) allows for a more nuanced examination of the territorial variations in the strategies pursued.

In accordance with the conceptual framework established by Geels (2002), there are three primary levels: niches, regimes, and landscape. Novelty emerges from niches, which are incubators for such developments. These are based on knowledge and skills and are centred on the problems, rules, and capabilities of existing regimes.

The emergence of a novelty can result in a transformation of the socio-technical regime, which can be conceptualised as a semi-coherent set of rules espoused by different social groups. By providing a framework for the activities of relevant groups, regimes gain a certain stability in their configurations. The landscape can be defined as an external structure or context within which actors interact. In contrast to regimes, which refer to rules that enable and constrain activities within communities, the landscape refers to wider technology-external factors. As a result, the context of the landscape is more challenging to change than that of regimes.

Amore *et al.* (2018) adopt a multi-level perspective on tourism systems, diverging from the original scheme by introducing an additional level: individual decision-making (Fig. 2). The aforementioned actors can be grouped according to their social status and role within the system. This includes residents, tourists, individual business people, and policymakers. The authors emphasise the capacity of individuals to exert influence on the activities and decisions of other actors operating at the niche, regime, and landscape levels. Moreover, the authors emphasise that destinations can be conceptualised as complex adaptive systems, where various systems, including ecological, socio-ecological, socio-political, socio-economic, and socio-technological, interact dynamically with the regime (*ibidem*, p. 239).

Fig. 2. A theoretical model of destination actors from the MLP perspective



Source: Own elaboration based on Amore *et al.* (2018).

*Territorial Context*

The configuration of the multi-level perspective in rural tourism in Italy lends itself well to a series of analyses of the dynamics of individual actors, niches, regimes and the landscape. The multi-level perspective must be considered in the light of the paradigms outlined above, i.e. the design of development paths, the choice between path dependency and path plasticity, and the resilience of the systems themselves to external situations that increasingly affect all levels, especially the local level.

The concept of resilience has become increasingly important in discussions on sustainable development, especially in rural areas. As regions around the world grapple with the multiple challenges of climate, economic and social change, the ability of these areas to adapt and thrive is becoming increasingly

important. This paper examines the strategies of Trentino and Puglia, two different Italian regions, focusing on their approaches to tourism and agriculture. Despite their different geographical and socio-economic contexts, these regions serve as valuable examples of how rural areas can innovate and thrive in the face of global challenges.

Located in the Italian Alps, Trentino is renowned for its breathtaking landscapes and rich cultural heritage. Traditionally known as a winter holiday destination, Trentino has reoriented its approach to tourism to prioritise sustainability. This shift is evidenced by the region's prioritisation of eco-friendly accommodation, nature conservation and cultural preservation. Trentino's strategy to reconcile the environmental impact of tourism with economic development encompasses initiatives such as the promotion of hiking and cycling trails, support for local food producers and the protection of cultural sites.

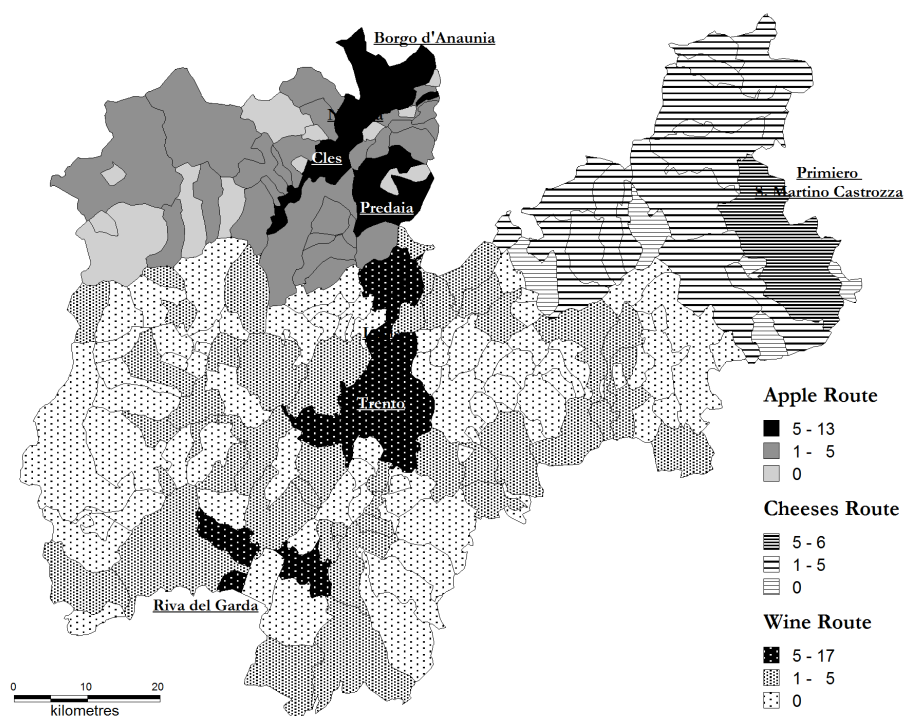
The transformation of the tourism industry in Trentino serves as an exemplar of the region's capacity for adaptation. Following the onset of the global pandemic, the tourism industry demonstrated a swift recovery, reaching pre-pandemic levels within a relatively short period. In 2022, the region welcomed 4.484 million visitors, while in 2023, this figure increased to 4.859 million. The diversification of tourism offerings in Trentino, encompassing winter sports and summer activities, reflects a broader trend towards reducing seasonality and promoting year-round tourism. Nevertheless, the region is confronted with a number of challenges, including the issue of overtourism, the impact of climate change and the necessity for sustainable infrastructure development.

The cultivation of apple orchards and vineyards has constituted an integral part of the region's cultural landscape for a considerable length of time. However, this sector has undergone significant transformations as a consequence of a reduction in the number of farms and an ageing farming population. The regional agricultural system has increasingly concentrated its production activities in the most promising areas, while marginal land is being progressively relinquished (Tognon *et al.*, 2022).

Notwithstanding these challenges, Trentino's agricultural sector is characterised by the adoption of innovative approaches. The region's dedication to quality and sustainability is exemplified by the Flavour Routes (Fig. 3), which provide distinctive experiences by facilitating interactions between visitors and local producers. This approach serves to reinforce the agricultural economy while simultaneously promoting the conservation of Trentino's natural and cultural heritage.

The strategies employed by Trentino are firmly anchored in the concepts of path dependency and path creation. The historical dependence on winter

Fig. 3. The Trentino Flavour Routes



Source: Own elaboration.

tourism and agriculture has had a significant impact on the current economic and social fabric of the region. However, through the implementation of innovative strategies, such as the establishment of the Flavour Routes and the adoption of sustainable tourism practices, Trentino is effectively creating new pathways that are more resilient to external pressures. The region's capacity to adapt while preserving its identity exemplifies the dynamic interplay between traditional practices and emerging opportunities.

Puglia, located in southern Italy, is confronted with a number of distinctive challenges, including those pertaining to the sustainability of agricultural practices, the scarcity of water resources and the issue of youth unemployment. In response, the region has implemented agro-ecological practices that

promote sustainable agriculture and mitigate the effects of climate change. The strategy employed by Puglia to cultivate resilient rural areas is based on a series of initiatives, including the implementation of organic farming techniques, the utilisation of water-saving irrigation methods, and the undertaking of reforestation projects (Belliggiano, 2010).

The agricultural sector in Puglia is distinguished by a multiplicity of production scenarios, which mirror the region's heterogeneous landscapes. However, the sector is confronted with significant challenges, including limited national and international competitiveness, an inadequate organisation of the supply chain, and an ageing agricultural workforce. In order to address these issues, Puglia is concentrating its efforts on the implementation of innovative techniques and the introduction of advanced technologies with a view to enhancing productivity and sustainability.

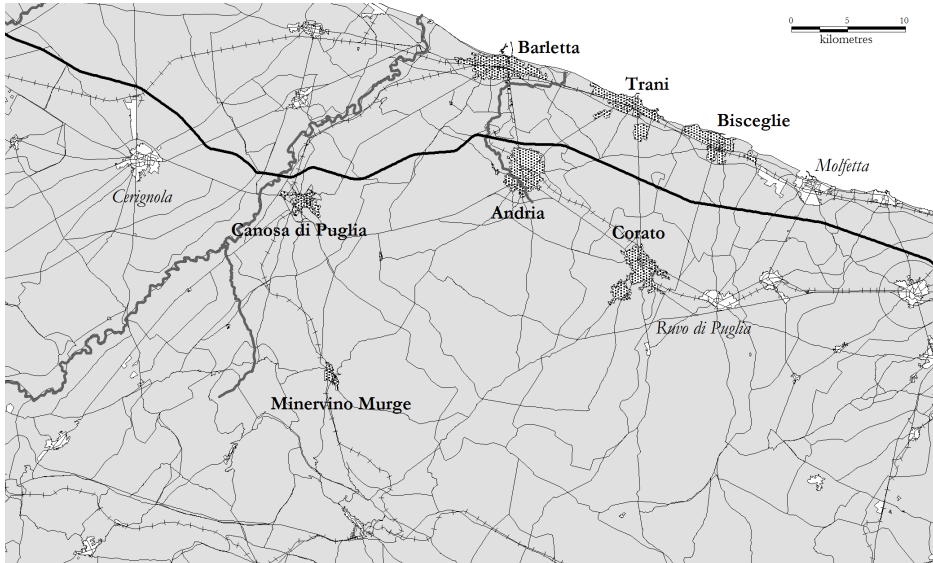
Since the early 2000s, the tourism sector in Puglia has undergone a period of substantial growth, largely attributable to the introduction of a new regional tourism policy, the development of enhanced transportation infrastructure, and the implementation of strategic marketing measures. The tourism industry in Puglia is characterised by a strong seasonal bias, with the majority of visitors arriving during the summer months to enjoy the region's coastal resorts. Nevertheless, Puglia still presents untapped potential in niche areas such as oleotourism (Campón Cerro *et al.*, 2014), which exploits the region's extensive olive oil production.

The Castel del Monte Oil Route (Fig. 4) provides an illustrative example of this potential, offering visitors a distinctive experience that integrates agricultural and tourism activities. This initiative serves to highlight the high quality of Puglia's olive oil while simultaneously promoting economic development in rural areas that are typically less accessible to tourists. The combination of cultural heritage and modern tourism practices is enabling Puglia to promote a more resilient and diversified tourism industry.

The concept of resilience in Puglia is informed by the socio-economic context in which traditional practices coexist with the imperative for modernisation. The challenges confronting the region, exemplified by the emergence of *Xylella fastidiosa* and its subsequent devastation of olive groves, underscore the vital necessity for innovation and adaptability. In this context, oleotourism and agro-ecological practices represent potential avenues for sustainable development, with the capacity to revitalise rural areas and safeguard cultural heritage.

Furthermore, the strategies of Puglia place considerable emphasis on the importance of collaboration among stakeholders, including public institutions, local communities, and private enterprises. By fostering collaborative relationships and implementing sustainable methodologies, Puglia strives to

Fig. 4. The municipalities of Castel del Monte Oil Route



Source: Own elaboration.

cultivate a more resilient region, capable of withstanding both economic and environmental challenges.

A comparison between Trentino and Puglia offers insights into the concepts of resilience and sustainability. Both regions have formulated strategies that facilitate economic growth while safeguarding cultural and environmental resources. Trentino's emphasis on sustainable tourism and agricultural innovation represents a model of resilience, harmoniously combining tradition and modernity. The region's capacity to adapt its tourism offerings and integrate agriculture with tourism serves to illustrate its strategic approach to sustainability. Nevertheless, the case of Puglia demonstrates the potential of rural areas to reinvent themselves by capitalising on their unique assets, as evidenced by the region's emphasis on agro-ecological practices and oleotourism.

Despite facing similar challenges, including an ageing population, environmental pressures and the necessity to expand infrastructure, the two regions are pursuing disparate approaches that are shaped by their distinct contexts. Trentino's strategy is more advanced and is supported by well-established networks and infrastructure, whereas Puglia is still in the initial stages of developing its tourism and agricultural sectors.



## *Methodology*

This paper reports on the initial phase of a planned analysis, which is based on the theoretical innovation proposed by Amore *et al.* (2018). The focus is on the individual actors involved in the diverse mosaic of itineraries under study, including producers and retailers.

Anonymous questionnaires were prepared and distributed electronically to the stakeholders of the offer. In the case of the Wine Route and the Apple Route, the questionnaires were preceded by a letter of support from the administrative coordination centres of the Routes.

The initial section of the questionnaires encompassed a range of demographic data, including the respondent's age, profession, the nature of their activity, and the municipality in which the activity is conducted. The second section of the questionnaire inquired about the perceived strengths and weaknesses of the activities, the importance of tourism, the role of the local community, and the effectiveness of public policies. A third section pertained to the perception of sustainability practices, which were understood not only in an environmental sense, but also in a cultural and economic sense. The fourth section pertained to the respondents' level of involvement in the route project and their assessment of its efficacy. Additionally, inquiries were posed regarding future prospects, encompassing particular subjects related to agriculture, climate change, the potential hazard of overtourism, and, in the case of Puglia, the impact of *Xylella* on economic activity.

It should be noted that the number of respondents was relatively limited (21 in Trentino and 3 in Puglia), and that the remarks included in this contribution are therefore based on a small sample. Nevertheless, the number of responses is deemed sufficient to permit the identification of certain issues that emerged during the course of the study. In the future, new techniques will be explored with the aim of achieving greater participation in the research.

## *Results*

The survey, conducted as part of this study, offers insight into the demographic characteristics and occupational profiles of individuals engaged in tourism-related activities in Trentino and Puglia (Tab. 1). This analysis reveals both differences and similarities between the two regions, which serve to emphasise the unique characteristics of their respective tourism landscapes. In Trentino, the majority of respondents are within the 25-34 and 35-44 age groups, indicating a younger population that is actively engaged in tourism and related sectors. This younger demographic indicates a dynamic

and innovative approach to tourism, which is likely to generate new ideas and practices that will appeal to the modern traveller. The gender distribution among respondents is balanced, with both men and women well represented, thereby ensuring a diversity of perspectives in tourism development and management.

The occupations of the interviewees in Trentino include those in agriculture, administration, catering and marketing. This diversity is reflective of the close intertwining of agriculture and tourism in the region, where local agricultural practices play a significant role in shaping the tourist experience. The responses from the various localities in Trentino demonstrate that the region's tourism landscape is characterised by a high degree of diversity, encompassing both natural landscapes and cultural heritage sites.

In contrast, the respondents from Puglia are predominantly between the ages of 55 and 64, which suggests that the demographic involved in tourism activities is older. This cohort of older individuals may be indicative of a more traditional approach to tourism, grounded in established practices and products. Similarly, the gender balance observed in Trentino is reflected in Puglia, ensuring inclusivity in the tourism sector. In Puglia, however, the occupational focus is more specialised, with a significant proportion of respondents engaged in olive oil production and related administrative functions. This area of specialisation serves to highlight the significant correlation between local agricultural products and tourism, particularly within the emerging oleotourism sector.

The responses from Puglia are concentrated on particular towns, such as Canosa di Puglia and Andria, indicating a more concentrated tourism strategy that focuses on areas renowned for their cultural and agricultural significance. The findings of the survey indicate that Trentino attracts a younger and more diverse population, which in turn leads to a greater variety of occupations within the tourism sector. In contrast, respondents in Puglia are older and more concentrated in specific industries, such as olive oil production.

Notwithstanding the aforementioned discrepancies, both regions exhibit a gender balance and a robust interconnection between tourism and local agricultural practices, underscoring the pivotal role of local resources in advancing sustainable tourism. The analysis highlights the necessity for the implementation of bespoke tourism development strategies that take into account the distinctive characteristics and capabilities of each region.

Tab. 1. Some features emerging from questionnaires of Trentino and Puglia Routes

| Features                                           | Trentino Routes                                                                  | Puglia Route                                                                    |
|----------------------------------------------------|----------------------------------------------------------------------------------|---------------------------------------------------------------------------------|
| Age                                                | 25-44                                                                            | 55-64                                                                           |
| Strengths                                          | Cultural heritage (26%)<br>Quality of productions (21%)<br>Sustainability (19%)  | Sustainability (30%)<br>Quality of productions (30%)<br>Cultural heritage (20%) |
| Weaknesses                                         | Depopulation, ageing (30%)<br>Economic decline (22%)<br>Access to services (22%) | Environmental vulnerability (43%)<br>Access to services (22%)                   |
| Relevance of tourism in rural areas (out of 10)    | 8.29                                                                             | 8.33                                                                            |
| Relevance of sustainability (out of 10)            | 8.81                                                                             | 9.33                                                                            |
| Local community involvement (out of 10)            | 6.33                                                                             | 7.67                                                                            |
| Effectiveness of public policies (out of 10)       | 6.19                                                                             | 7.00                                                                            |
| Relevance of collaboration to projects (out of 10) | 8.33                                                                             | 8.67                                                                            |
| Actual advantage in the route project (out of 10)  | 6.76                                                                             | 6.00                                                                            |

Source: Own elaboration.

The experiences of Trentino and Puglia illustrate the pivotal role of resilience in rural development. As these regions navigate the complex economic and environmental challenges of the present era, their strategies offer invaluable insights for other rural areas. By fostering innovation, sustainability and collaboration, regions like Trentino and Puglia are not only preserving their cultural and natural heritage, but also ensuring a sustainable future for their communities.

A strategic approach that integrates tourism, agriculture, and sustainability can assist rural areas in flourishing despite adversity. Trentino and Puglia serve as compelling illustrations of how regions can leverage their strengths to foster resilient and dynamic communities equipped to confront the challenges of the 21st century. Their experiences demonstrate the significance of adaptability, innovation, and collaboration in the pursuit of sustainable development, and offer a framework for other regions striving to enhance their resilience and ensure a sustainable future for their inhabitants.

## *Conclusions*

The aim of this paper is to provide a concise overview of two distinct approaches to tourism in rural settings, as perceived by the key stakeholders involved. This will be achieved through the analysis of responses obtained from questionnaires.

Rural tourism in Trentino is a well-established phenomenon that represents a significant avenue of development as an alternative to traditional winter tourism. The division into three routes has resulted in a novel form of regionalisation among tourists, which is favoured by the presence of typical quality productions and facilitated by the organisation of typical mountain agriculture (small quantities, social cooperatives).

From a multi-level perspective, the niche is populated by small, dynamic local producers and by tourists seeking experiences that align with their values, such as nature and sustainability. As a result of the growing interest from tourists, some traditional forms of production have been gradually abandoned in favour of new market products, including medicinal herbs and natural cosmetics. One of the most significant challenges at this level is the ageing population and the lack of intergenerational turnover, which is necessary for the emergence of youth entrepreneurship.

At the regional level, a robust governance structure has been established, comprising the Province, the APT (“Azienda Provinciale per il Turismo”) i.e. the local Destination Management Organisations, and the Routes. This structure encompasses experienced tourism entrepreneurs, including hotel and restaurant operators, as well as innovative agricultural firms that are introducing new tourist offerings through the revitalisation of traditional building structures, such as “malghe” and “masi”. In any case, the responses indicate a dearth of services and infrastructure, underscoring the necessity for enhanced collaboration between the agricultural and tourism sectors, the promotion of the sustainability and quality of local products, and the reinforcement of cultural preservation initiatives.

The landscape level is constituted by the exogenous environment, which is challenging to regulate at the local level. The primary concerns pertain to climate change, which is particularly evident in the Alps, and to the general decline of the agricultural economy, which is witnessing a notable reduction in employment prospects.

Ultimately, despite some difficulties, an illustrative example of path plasticity is being trialled in Trentino, which may serve as a model for replication in other rural areas.

Conversely, rural tourism in Puglia represents a novel avenue for exploration. In this sense, oleotourism represents a novel challenge to reinforce the regions that have hitherto been underappreciated for their tourism potential,

and which possess quality products (five DOP and one IGP) that could be highly valued by travellers.

The niche level needs profound restructuring, as it has an offer with few large companies, a lack of innovation and ingenuity on the part of local actors, and an imbalance in tourism polarisation in favour of seaside resorts, larger cities and some established tourism segments like religious tourism.

At the regional level, the effectiveness of governance in promoting tourism planning has been limited. Attempts to establish public-private tourism organisations (DMOs) have yielded minimal results, and tourism entrepreneurs have remained largely anchored to traditional offerings, with management methods that are not particularly innovative.

Additionally, concerns have been raised at the landscape level, particularly in response to the *Xylella* emergency and the impact of climate change on water resource scarcity.

Nevertheless, recent initiatives by local communities and associations offer grounds for optimism regarding the potential for a development path that deviates from the existing path dependency. This is particularly encouraging given the prospect of stronger collaboration between local actors, regional government agencies and agricultural, productive and tourism entrepreneurs.

In conclusion, the application of the multi-level perspective to rural tourism could offer the possibility of carrying out diachronic analytical approaches, also capable of designing possible future development trajectories. Therefore, the intention to follow this avenue of research should improve the evaluation capabilities regarding complex territorial systems.

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**Keywords:** multi-level perspective, rural tourism, territorial development

**Parole chiave:** prospettiva multi-livello, turismo rurale, sviluppo territoriale

**ABSTRACT** – This contribution intends to explore the development paths of rural tourism in two very different realities, Trentino and Apulia (Italy). In particular, it investigates, through the conceptual paradigm of the multi-level perspective, the relationship between individual actors and other levels of interaction, drawing some insights from the administration of questionnaires.

**RIASSUNTO** – Il presente contributo intende esplorare i sentieri di sviluppo del turismo rurale in due realtà molto differenti, il Trentino e la Puglia. In particolare, si indaga, tramite il paradigma concettuale della prospettiva multi-livello, il rapporto fra i singoli attori e gli altri livelli di interazione, traendo alcuni spunti di riflessione dalla somministrazione di appositi questionari.

**RÉSUMÉ** – L'article entend explorer les voies de développement du tourisme rural dans deux réalités très différentes, le Trentin et les Pouilles (Italie). En particulier, l'étude se concentre sur la relation entre les acteurs individuels et les autres niveaux d'interaction à travers le paradigme conceptuel de la perspective multi-niveaux, offrant des éléments de réflexion à partir de l'administration de questionnaires spécifiques.

**ZUSAMMENFASSUNG** – Dieser Beitrag hat zum Ziel, die Entwicklungspfade des ländlichen Tourismus in zwei sehr unterschiedlichen Regionen – Trentino und Apulien (Italien) – zu untersuchen. Unter Anwendung des konzeptionellen Paradigmas der Multi-Level-Perspektive wird insbesondere die Beziehung zwischen den einzelnen Akteuren und den verschiedenen Interaktionsebenen analysiert. Dabei werden einige Reflexionsansätze aus der Durchführung spezieller Fragebögen abgeleitet.

**RESUMEN** – Este artículo tiene como objetivo explorar los caminos de desarrollo del turismo rural en dos contextos muy diferentes, Trentino y Apulia (Italia). A través del marco conceptual de la perspectiva multinivel, se examina en detalle la relación entre los actores individuales y los diferentes niveles de interacción. La investigación se basa en la aplicación de cuestionarios diseñados específicamente, de los cuales se derivan algunas reflexiones clave para la discusión académica.





ELEONORA PANIZZA\*

Exploring the influence of policy options on flood displacement in Sudan  
*Esplorare l'influenza delle opzioni politiche sugli spostamenti dovuti alle inondazioni in Sudan*

*Introduction*

Environmental disasters are a global challenge, disproportionately affecting territories that are highly exposed to hazardous events, densely populated, characterized by widespread socioeconomic vulnerability, and experiencing increasing frequency and intensity of extreme events (IPCC, 2023).

Disasters severely disrupt the stability of the affected community, as their impact may damage buildings (including houses), infrastructure, services, and the economic fabric, as well as cause injuries, deaths, and illnesses in the population (UNGA, 2016). As a consequence, disasters also impact the mobility dynamics of the population, forcing some people to flee their places of residence involuntarily, for example, after losing their house or livelihood (Vestby *et al.*, 2024; Ahmad, Afzal, 2020; Armah *et al.*, 2020; Smith, 2013; Black *et al.*, 2011), while other people may become trapped, if they are severely affected but lack the resources or capacity to move to a safer place (Carling, 2002; Carling, Schewel, 2018; Black, Collyer, 2014; Zickgraf, 2021, 2018; Blondin, 2018). Floods are the most common driver of disaster displacement worldwide, with over 195 million internal displacements between 2008 and 2023, an average of approximately 12 million per year (IDMC, 2024).

Flood risk assessment and mitigation require adequate data and knowledge, but also tools and models to analyze the interactions between hazards and human mobility in all its forms (Rossi *et al.*, 2024). These are essential for estimating the number of people who may be affected, displaced, or trapped under current conditions, as well as in different scenarios. Indeed, models can

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be used to simulate population behavior under future climate scenarios or different policy options.

Existing flood displacement risk assessment models include information about exposure, the structural vulnerability of houses, and flood hazards (frequency and intensity) (Anzellini *et al.*, 2017). However, the existing approaches lack local and disaggregated population data, including socioeconomic conditions, risk perception, and experiences – factors that are crucial for understanding how people respond to floods and their mobility dynamics (Foresight, 2011). Displacement is not only driven by material damage but also by personal or household factors, such as awareness, fear, socioeconomic vulnerabilities, and prior experience with disasters (Black *et al.*, 2011; Kniveton, 2011; Kakinuma *et al.*, 2020).

Moreover, there is a gap in tools for policy analysis in the context of flood displacement risk. Testing the effectiveness of various risk mitigation policies within specific socio-geographical contexts supports the definition and implementation of the most suitable strategies. Disaggregated and local data are required, as there is no one-size-fits-all solution, so policies must be tailored to the unique needs, vulnerabilities, and capacities of the community to ensure effectiveness and sustainability over time.

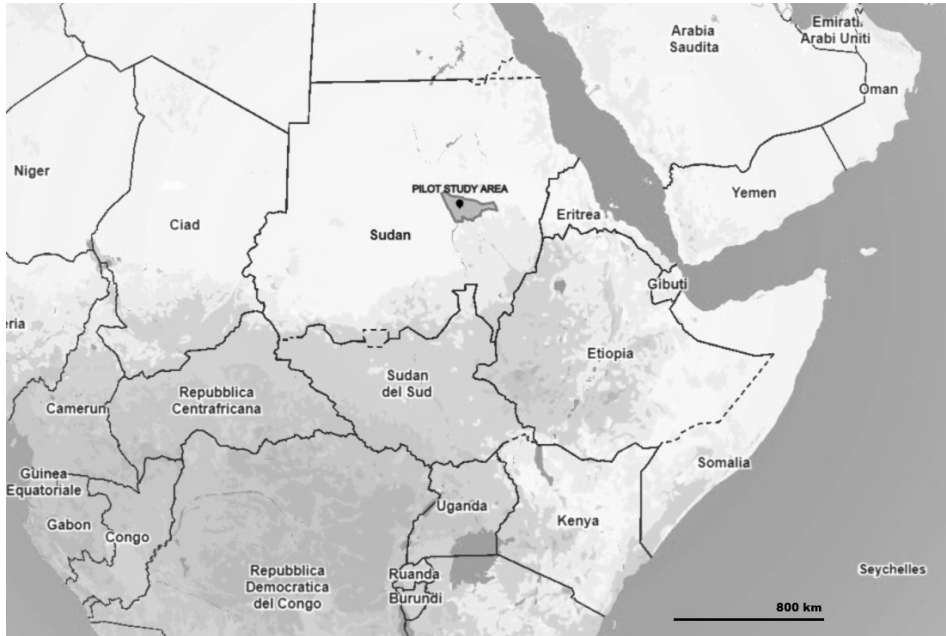
This study aims to address these gaps by developing a new methodology and modeling approach for integrating household data in the analysis of flood mobility dynamics under both current conditions and different policy scenarios. The research combines household survey data with computational modeling – an agent-based model – to capture mobility patterns over time. The focus is on a pilot case study in Sudan, specifically on seven villages in a flood-prone area along the Nile River.

### *Pilot case study*

Sudan is located in the northeastern part of the IGAD (Intergovernmental Authority on Development) region and consists of 18 states, forming a federal republic (Fig. 1). The country comprises various ecological zones and landscapes, ranging from the arid desert in the North, with extreme temperatures and almost no precipitation, to more moderate climatic regions in the South, with more abundant water resources (RCCC, ICRC, 2021). The Nile crosses the country, originating at the confluence of the Blue Nile and the White Nile, in proximity to the capital Khartoum, and flowing into the Mediterranean Sea.

Agriculture is dominant in Sudan, employing 65% of the population and being the cornerstone of households' livelihood (FAO, 2023). Poverty is a widespread challenge, particularly in rural areas, where access to resources,

Fig. 1. Location of the pilot study area in Khartoum State, Sudan



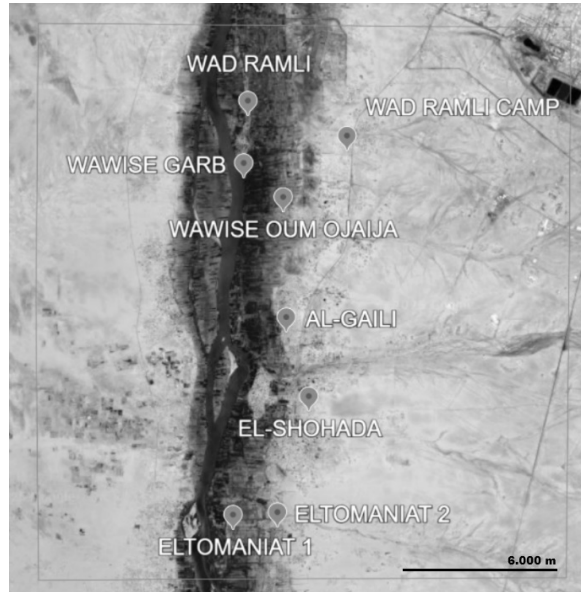
Source: Author's elaboration from Google Earth.

economic opportunities, and essential services is limited (WB; UNDP, 2022). Sudan also ranks low – 171<sup>st</sup> out of 190 countries – on the Human Development Index (HDI), which assesses health, education, and economic parameters (UNDP, 2022).

Sudan faces severe environmental challenges. Between 2000 and 2022, the country experienced four major droughts (2000, 2012, 2015, 2022) and 26 significant floods (CRED, 2024). These events cause severe threats to human lives, livelihoods, assets, and properties, further exacerbating the country's socioeconomic and political issues.

For this study, seven villages within the Bahri locality in Khartoum state were selected as a narrower geographical area for data collection and model implementation (Fig. 2). Khartoum state was chosen due to its high population density and high exposure to flooding, as it is crossed by the Nile from south to north. The selected villages are in a rural area that faces frequent and severe riverine floods leading to significant human displacement and vulnerability issues (OCHA, 2020; 2021; 2022). The gap in existing data and knowledge about population characteristics and flood displacement dynamics needed first-hand data collection efforts.

Fig. 2. The seven villages included in the study



Source: Author's elaboration from Google Earth.

Among the selected villages, Al-Gaili, Eltomaniat 1, Wawise Oum Ojaija, and Wad Ramli are older, formal, and structured villages (Fig. 2). In contrast, Eltomaniat 2, El-Shohada, Wawise Garb, and Wad Ramli Camp have emerged more recently without formal planning, in response to immediate needs caused by flood damage (Fig. 2).

- Eltomaniat 1 is a small rural settlement near the Nile and is highly affected by floods. Many displaced people relocated to Eltomaniat 2, an uninhabited private land where a settlement of tents emerged.
- Al-Gaili is a large, long-standing town with essential facilities (education and healthcare) and good infrastructure, but it is frequently hit by floods which destroy homes and force people to move.
- El-Shohada is a relatively new settlement that developed in response to flooding in surrounding areas. Over time, it has grown with permanent housing and public buildings, suggesting that the settlement is becoming permanent.
- Wawise Oum Ojaija is a formal village with essential services but is highly flood-prone. Wawise Garb, a small rural village, has been repeatedly devastated by floods, forcing all residents to relocate to Wawise Elgedada, a safer nearby area.

- Wad Ramli is a structured city along the Nile, severely affected by multiple floods, with 2019, 2020, and 2021 events being the most recent. Many displaced people moved to Wad Ramli Camp, a settlement of tents providing shelter and basic services, located a few kilometers away.

### *Methodology*

Mobility dynamics are not just a function of the combination of hazard, exposure, and vulnerability of assets. They are also deeply influenced by the population's social, economic, cultural, and individual characteristics in the affected or flood-prone areas (Foresight, 2011; Kniveton, 2011). Moreover, the unique characteristics and challenges of the geographical context further amplify the complexity of these dynamics. Integrating these factors into the analysis leads to a more comprehensive and holistic understanding of the relationship between flood risk and mobility dynamics.

As existing data for the pilot study area was scarce and scattered, a household survey was designed to collect primary data due to its suitability to reach a large and representative sample of a target population, collecting their observations, experiences, opinions, and feelings (Hox, Boeijs, 2005). For this study, the household questionnaire was designed with three sections to collect disaggregated and local data from the selected villages:

1. Socioeconomic characteristics and vulnerabilities: household size and composition (gender, age, disability, chronic illness), occupations, ownership of assets (houses, croplands, livestock, vehicles), income, access to education and healthcare, housing construction material. These household characteristics contribute to their vulnerability to flood events and their capacity to respond effectively by implementing mitigation actions or evacuating preventively.
2. Flood and displacement experience: number of experienced floods, flood damage to houses and livelihood, and mobility dynamics. Respondents provided insights into the reasons behind their decision to move or stay, the timing and destination of their displacement, and the duration of their displacement experience.
3. Risk perception and expectations: flood risk awareness, flood fear, risk of flood displacement, actions in case of flooding, actors responsible for risk management, and availability to relocate. This section focuses on providing a broader perspective on residents' views on changes in flood events (frequency, intensity, and predictability), risk perception, and coping strategies. These cultural and behavioral elements are crucial as they affect mobility patterns and decision-making.

The survey was conducted in the selected villages, targeting a representative sample of the total population. Given an estimated 3,120 households (Center for International Earth Science Information Network & Novel-T, 2021), 300 questionnaires were administered, ensuring a 95% confidence level with a 5.4% margin of error. Data collection took place in person and in Arabic between June 20<sup>th</sup> and July 7<sup>th</sup>, 2022.

Survey data not only expanded knowledge about the local context and its population by providing both quantitative and qualitative insights, but it also informed and supported the development of the modeling technique for simulating mobility patterns and assessing the impact of policy options. This study developed an agent-based model (ABM), a “computational method that enables a researcher to create, analyze, and experiment with models composed of agents that interact within an environment” (Gilbert, 2008; Dawson *et al.*, 2011). This approach is effective for simulating complex social systems, as it analyzes micro-level interactions under various conditions, including hypothetical scenarios that do not exist yet.

In this study’s ABM, two types of agents were created - both autonomous entities acting within the pilot area:

- Household Agents (HA): actual households living in the research area, with specific characteristics derived from survey data (socioeconomic factors, past flood experience, and risk perception). Based on these characteristics and simulated flood events, HAs exhibit different mobility responses, namely preventive evacuation, post-flood evacuation, remaining in their place, or becoming trapped.
- Political Agent (PA): a conceptual representation of real political entities with governing authority over the villages, ranging from local to national levels. The PA is responsible for implementing policy interventions to influence mobility patterns and mitigate flood risks.

The model environment, the second ABM feature, represents the seven Sudanese villages through a simplified spatial system, incorporating boundaries, settlements, facilities, rivers, roads, and flood events. Ten series of simulated flood events were generated using historical data and probabilistic modeling, covering a 30-year period. These scenarios were ranked by flood frequency and intensity, ranging from the least to the most severe hazard scenario that an HA could experience in his life.

The baseline model reflects current conditions, with no risk reduction policies in place. The ABM was then used to evaluate the impact of five different policy options that the PA could implement, providing evidence-based insights for real decision-makers. These policies were tested both individually and in combination to identify the most effective strategies for reducing involuntary mobility after flooding, decreasing the number of trapped HAs,

fostering preventive evacuation, and shortening displacement duration. The policy options included:

- Early Warning System (EWS): alerts are issued when extreme events are forecasted, giving HA sufficient time to evacuate safely. The EWS was tested at different efficiency levels (low, medium, high) by varying false alarm and false negative rates.
- Basic Income Programme (BI): HAs receive financial support to alleviate poverty and reduce the number of trapped households due to lack of resources.
- Awareness Programme (AW): initiatives for enhancing public understanding and preparedness for flooding. This includes education initiatives, community training, drills, and simulations.
- House Repair Programme (RP): structural damage caused by flooding is repaired by the government, reducing the financial burden on affected households. Houses are rebuilt using the original materials. The RP was tested in three different modes with 30%, 60%, and 90% of damaged houses being repaired by the government (RP30, RP60, RP90, respectively).
- Build Back Better Programme (BBB): the government not only repairs house damage but also enhances overall housing quality using more resilient materials and construction techniques to reduce structural vulnerability to future floods.

The effectiveness of the policy options was evaluated using a set of metrics: total number of preventive evacuations, post-flood displacements, and immobility occurrences (trapped households), as well as the maximum displacement length per household. These metrics referred to simulated 30-year scenarios to assess and compare the impact of each policy option.

Following the conceptualization, the ABM was implemented and formalized into an operational tool. The actions and interactions between agents and the environment were structured into flowcharts, detailing each modeling step. In particular, this formalization defines how HAs respond when floods are forecasted and alerts are issued, as well as how they react when floods occur and cause damage to their houses and livelihoods. Based on household-specific characteristics from the survey data and the severity of flood damage, each HA may become displaced, trapped, or remain unaffected.

The ABM ran all possible scenario combinations, incorporating the ten flood scenarios (from least to most severe) and the different policy options. Each scenario was run 5,000 times to ensure statistical significance<sup>1</sup>.

<sup>1</sup> The required number of repetitions for each scenario was established using the experimental error variance analysis.



## Results

*Survey findings.* The surveyed population consisted of 38% minors, 51% adults, and 11% elderly (aged 60 years or more), with an average household size of six members. The gender distribution was relatively balanced across age groups. Chronic illnesses were common, affecting an average of one person per household, while physical or mental disabilities were less frequent.

The average monthly income was 73,370 Sudanese Pounds (SDG) (approximately USD 160.90 in 2022), with 13% of households living in extreme poverty earning less than 25,000 SDG (USD 54.82) per month. Income distribution varied: Al-Gaili had the highest proportion of households in extreme poverty; Wad Ramli had the highest proportion of wealthy households (earning more than 150,000 SDG, or USD 328.95, per month).

Homeownership rates were highest in Al-Gaili (72%), Al-Shohada (73%), Wad Ramli (59%), Wawise Oum Ojaija (83%), and Wawise Garb (89%). In contrast, Eltomaniat (9%) and Wad Ramli Camp (21%) had significantly lower rates, reflecting the presence of large numbers of displaced people living in temporary informal settlements. Housing quality also varied, with concrete houses being prevalent in Al-Gaili and Al-Shohada, while tents were prevalent in Eltomaniat and Wad Ramli Camp. 24% of households owned cropland, 29% owned livestock, and just 13% owned a vehicle.

Access to basic services was mixed. 90% of households had reliable drinking water, and 86% reported food security. 11% faced occasional and 3% chronic food insecurity. Healthcare access varied, with 50% having reliable access, 23% having serious difficulties, and 10% having no access. Education was limited, as 20% of households had no access to schools, while 44% had at least one university graduate, suggesting urban migration for higher education.

Flooding was reported as a frequent and severe issue. Among recent severe floods, the 2019 event was the most frequently reported (48%), followed by 2020 (33%) and 2021 (17%). 84% of respondents received no warnings, relying instead on indigenous knowledge for flood anticipation. For 81% of affected households, water levels inside houses ranged from hip to chest height. 68% of respondents reported severe house damage and 45% reported severe livelihood losses.

Flood-related displacement was widespread, with 67% of affected households forced to move. Most evacuated after the flood occurred, and only 7% managed to evacuate preventively. Half of the displaced households returned within six months, while 38% remained displaced for over a year. Despite severe damage, 24% of respondents remained in their affected houses, citing financial constraints, attachment to their land, or the need to protect their property as main reasons.



Most respondents believed floods had become more frequent (70%) and more intense (72%). The worsening of conditions was considered to be related to the lack of flood management (36%), God's will (36%), or climate change (28%). 81% recognized their area as flood-prone, 76% perceived a high or medium flood risk, and 72% acknowledged the risk of displacement. 69% expressed significant fear of flooding, yet 77% were willing to permanently relocate to a safer area.

Flood management responsibility was primarily attributed to citizens (72%), the Sudanese Red Crescent Society (63%), and the Army (56%), while political and religious leaders were perceived as less involved. In the event of flooding, 85% reported they would prioritize evacuation, while fewer would focus on securing their property. Moreover, in emergencies, most of them (40%) would ask relatives for support, while government assistance was mentioned by 23% of them.

*Model findings.* The analysis of flood mobility dynamics in the selected Sudanese villages under different policy scenarios revealed that no single policy combination was unequivocally more efficient than the others in reducing flood displacement, immobility, and displacement duration. Each combination presented trade-offs between positively impacting the number of immobility, displacement and preventive evacuation, and duration.

The Awareness Programme (AW) and the Basic Income Programme (BI), whether implemented alone or in combination, have a minimal impact on mobility patterns, showing that they are not sufficient to drive significant changes in the absence of other policy interventions. In particular, the economic support to households does not remove all constraints influencing household capacity to move in case of emergency, such as the responsibility to protect their property and the attachment to their place. This is compliant with the survey data, which revealed that households with higher incomes were more often reported to be trapped.

The Early Warning System (EWS) emerged as the most effective standalone policy as it increases the number of preventive evacuations and reduces immobility occurrence, even if implemented in its low-efficiency mode. On the contrary, EWS does not have an impact on displacement duration, as it does not influence the post-flood housing and economic recovery, but only the forecast and warning.

The Repair Programme (RP) reduced long-term displacement, as houses rebuilt by the government allowed affected people to return home earlier, particularly if they were low-income. On the other hand, it led to increased overall displacement rates because, by enabling returns in structurally vulnerable houses in flood-prone areas, households were repeatedly affected by floods, thus experiencing multiple displacements in 30 years. When combined with

the Build Back Better (BBB) Programme, immobility paradoxically rose, likely due to increased attachment to the property of households in the Sudanese villages. On the other hand, it reduced the structural vulnerability of houses, overall reducing the flood impact and losses.

Among the tested policy combinations, RP90 combined with the high-efficiency EWS emerged as the most effective in reducing immobility and displacement duration. This approach enhanced risk preparedness through an advanced forecasting system, while also strengthening the post-flood recovery phase through governmental support.

### *Conclusions*

This paper provides an overview of the agent-based model developed to simulate flood mobility dynamics in the seven villages in Sudan, as well as key findings from the study, without detailing all technical aspects of model implementation.

The ABM proved to be an effective tool for analyzing flood-related mobility in the selected area and assessing the impact of different policy options, taking into account the specific characteristics of the local context and households.

The study highlighted the complexity of interactions between flood disasters and mobility patterns. While no single policy combination emerged as effective across all metrics, the analysis offered interesting insights that can serve as the foundation for further research.

As a natural continuation of this work, future research will focus on refining the model, collecting additional data, and expanding the geographical scope of analysis. The comparison between different socio-geographical contexts will explore the potential for generalizing these context-specific findings.

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**Keywords:** Mobility dynamics, agent-based modeling, policy analysis, disaster risk reduction

**Parole chiave:** Dinamiche di mobilità, modellazione basata su agenti, analisi di politiche, riduzione del rischio di disastri

**SUMMARY** – An agent-based model (ABM) was developed to simulate flood mobility dynamics under current conditions and several hypothetical policy scenarios. A household survey was conducted in seven villages in Sudan, collecting data on socioeconomic characteristics, past flood experiences, and risk perception. Informing the ABM with this data allowed for the incorporation of local specificities and household heterogeneity.

**RIASSUNTO** – Un modello basato su agenti (ABM) è stato sviluppato per simulare dinamiche di mobilità in caso di alluvioni sia nelle condizioni attuali e in vari scenari politici ipotetici. È stata condotta un'indagine tra le famiglie di sette villaggi in Sudan, raccogliendo dati sulle caratteristiche socioeconomiche, esperienze passate e percezione del rischio. L'informazione fornita da questi dati ha permesso di incorporare le specificità locali e le caratteristiche eterogenee delle famiglie nell'ABM.

**RÉSUMÉ** – Un modèle basé sur des agents (ABM) a été développé pour simuler la dynamique de la mobilité en cas d'inondation dans les conditions actuelles et dans divers scénarios politiques hypothétiques. Une enquête menée dans sept villages du Soudan a recueilli des données socio-économiques, d'expériences d'inondations et de perception des risques, permettant d'intégrer les spécificités locales et l'hétérogénéité des ménages dans l'ABM.

**ZUSAMMENFASSUNG** – Ein agentenbasiertes Modell (ABM) wurde entwickelt, um die Mobilitätsdynamik bei Überschwemmungen und verschiedenen politischen Szenarien zu simulieren. In sieben sudanesischen Dörfern wurden Haushaltsdaten zu sozioökonomischen Merkmalen, Überschwemmungserfahrungen und Risikowahrnehmung erhoben, um lokale Besonderheiten und Haushaltsheterogenität im ABM zu berücksichtigen.

**RESUMEN** – Se desarrolló un modelo basado en agentes (ABM) para simular la dinámica de la movilidad por inundaciones en las condiciones actuales y en varios escenarios políticos hipotéticos. Se llevó a cabo una encuesta de hogares en siete pueblos de Sudán, en la que se recogieron datos sobre características socioeconómicas, experiencias pasadas de inundaciones y percepción del riesgo. La utilización de estos datos en el ABM permitió incorporar las especificidades locales y la heterogeneidad de los hogares.



Focus on Morocco  
*Focus sul Marocco*





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Territorial resilience in the face of climate change in Morocco

*La resilienza territoriale di fronte al cambiamento climatico in Marocco*

### *Introduction*

Territorial resilience has become an absolute necessity for territories and communities to better equip themselves to face uncertainties and risks caused by climate change and the transformation of socio-economic systems. It involves increasing the capacity of territories and local authorities to cope with turbulence and crises, as well as adapting to long-term transformations. Territorial observatories play a crucial role in managing these challenges by offering a platform to monitor and analyze territorial trends and the outcomes of public policies. Collaboration is an essential element for ensuring the sustainability of development initiatives. It fosters cooperation and the achievement of common goals while adapting to changes. Projects that rely on a participatory approach and collective action are more likely to succeed, as they take into account the needs and aspirations of local stakeholders (Beer, 2023). Furthermore, this enhances territorial resilience by involving local actors more in risk management and unforeseen events. In short, these key tools help strengthen the resilience of territories and ensure the sustainability of sustainable development projects. Through these tools, regions and communities will be better equipped to face uncertainty by adopting a collaborative approach. Local stakeholders can then join forces to pursue mutual interests and adapt to unforeseen circumstances. There is no internationally recognized definition of resilience.

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### *The concept of Territorial Resilience*

The international debate on territorial resilience has emerged regarding the ability of a territory, whether it is a city, a region, or even a country, to face, adapt to, and recover from external shocks or stresses. These stress factors can come from natural sources, such as weather disasters (hurricanes, floods, droughts), or be caused by social phenomena, such as recessions, conflicts, migratory waves, or pandemics. Territorial resilience to climate change corresponds to the ability of a region or community to adapt to and recover from the effects of this change. The effects of climate change, such as more frequent storms, persistent droughts, floods, and rising sea levels, can have disastrous consequences for populations, infrastructure, and local ecosystems (IPCC, 2022). Climate change affects the well-being and security of populations on a global scale, reducing the ability of communities to withstand and adapt to natural hazards and shocks. Numerous studies examine the relationship between resilience and certain key concepts generally present in the climate change literature: vulnerability, sustainability, adaptation, and transition. Its impacts are felt in various sectors, such as health, water resource management, and major risk prevention.

With the increase in natural, technological, and health risks that regions face, and in the context of economic and social changes, territorial resilience emerges as a solution to overcome crises and guide regions towards a long-term vision that takes risks into account and relies on local strengths and opportunities.

By revitalizing territorial dynamics and engaging all concerned actors (elected officials, economic actors, citizens), resilience strategies can energize territories and offer them new development perspectives. They require an integrated approach that considers the territory in all its dimensions – economic, social, and environmental – rather than isolated sectoral approaches.

### *The concept of “Territory”*

The concept of “territory” is not limited to physical space but also encompasses social, economic, cultural, and political aspects. Before delving into territorial resilience and its boundaries, it is crucial to understand what a territory is. It is the convergence point of economic, social, and ecological dimensions, and it is the site of the economic and social consequences of the economic reflection conducted there. It is primarily a conviviality, a set of places where culture is expressed. This relationship also binds people to their land, where their cultural identity develops. According to Dupuy and Burmeister (2003), the emergence of territories mainly results from interactions between stakeholders and the establishment of collaborative learning processes. In this

sense, it is functional to adopt a “proximity economics” approach to better consider the forms of territorial governance (Bourgeon, Bouchet, 2007). Regions can no longer simply analyze their strengths and challenges at a given moment. They must now engage and contribute to a broader dynamic that emerges through the implementation of local governance.

This local governance is based on the collection, sharing, and analysis of collective data, verified and analyzed by various actors. Thus, the territory is seen as the framework in which territorial governance unfolds. It is essential not to view the territory as a monolithic entity – political or administrative – but rather as a dynamic set of interactions between various actors. This territory is a living ecosystem, a complex network of connected individuals and entities, extending well beyond local borders. One can ultimately argue that territory is an emerging social construct, resulting from the complex interaction of various factors, including history, culture, natural resources, and human relationships. A heterogeneous group of individuals, not just economic ones, comes together to examine a new production method. They activate local resources to revitalize the territory.

This gathering is characterized by the participants’ commitment, as they engage in a collaborative approach and harmonize their actions. These collaborative logics can materialize through the establishment of various governance mechanisms, moving away from the traditional regulatory model, which is that of the market. Agreements, understandings, networks, and collaboration – whether structured or spontaneous – are the tools stakeholders use to emerge within the space between dynamic territories (Honoré, 2019).

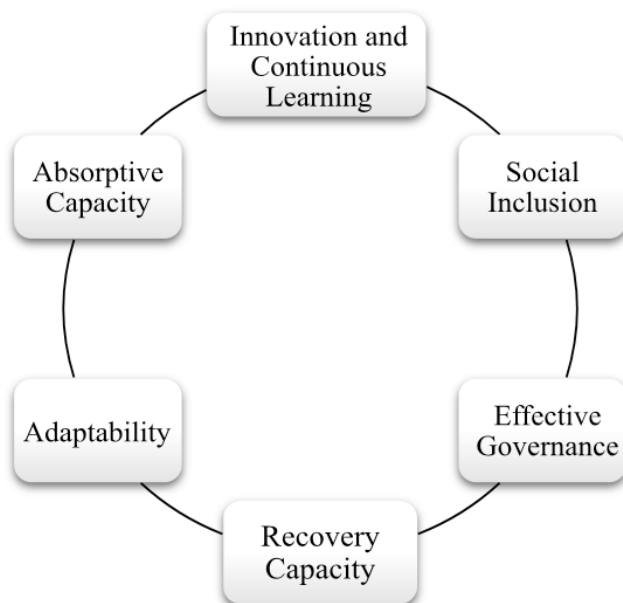
### *The key principles of territorial resilience*

The scheme below summarizes the key principles of territorial resilience (Fig. 1).

*Absorptive Capacity.* Absorption is a crucial aspect of territorial resilience. A resilient territory is capable of withstanding initial shocks without suffering devastating damage. This can mean robust infrastructure, effective early warning systems, and well-developed emergency plans.

*Adaptability.* The adaptability of territory is a fundamental aspect of territorial resilience. It corresponds to its ability to adjust its practices, policies, and infrastructure to face new challenges and environmental, social, or economic changes. These adjustments can take the form of investments in a diversified economy, the implementation of stricter environmental regulations, or the promotion of environmentally friendly lifestyles. This adaptability allows territories to continue functioning and developing despite the obstacles they encounter.

Fig. 1. Key principles of territorial resilience



Source: CEREMA (2022).

*Recovery Capacity.* After a traumatic event, the resilience of a place determines its ability to recover and rebuild. This may require physical reconstruction efforts, assistance measures for affected populations, and initiatives aimed at restoring the confidence of investors and residents. Recovery capacity is a crucial aspect of territorial resilience. It refers to the ability of territory to quickly recover after a disruption or crisis, restoring its essential functions and returning to a stable state, or even improving it.

*Effective Governance.* Efficient management is crucial for enhancing the resilience of territories. This requires coordination between different levels of government, as well as active involvement of local stakeholders, including businesses, community organizations, and citizens. Effective governance allows for the anticipation, response, and adaptation to disruptions, whether slow or sudden, by promoting learning, adaptation, and innovation.

*Social Inclusion.* It is crucial to adopt an inclusive approach to ensure that all groups in society benefit from resilience measures and are not forgotten during the development and implementation of policies. Reducing resilience disparities, strengthening social and community networks, fair access to resources and service, recognition of local knowledge, community empower-

ment: by incorporating these principles of social inclusion into territorial resilience strategies, territories can not only strengthen their ability to cope with environmental shocks and pressures but also promote a more equitable, just, and sustainable society.

*Innovation and Continuous Learning.* Resilient territories are capable of innovating and learning from their past experiences. This can take the form of adopting new technologies, developing innovative agricultural or urban practices, or implementing monitoring and evaluation mechanisms to assess the effectiveness of resilience strategies.

### *Territorial resilience strategies*

There are territorial resilience strategies that local authorities can adopt. The withdrawal strategy involves leaving the territory temporarily or permanently (Fig. 2). The adaptation strategy consists of making fine adjustments by targeting the sources of problems while maintaining the system's functioning. Finally, there is the genetic adaptation strategy, which corresponds to a profound transformation of the system.

Fig. 2. Territorial Resilience Strategies



Source: CEREMA (2022).

*Risk Assessment and Planning.* It is crucial to understand the unique dangers a region faces due to climate change. A detailed analysis of current and future vulnerabilities can guide the development of plans and the allocation of resources to mitigate these threats.

*Resilient Infrastructure.* Investing in resilient infrastructure can mitigate the damage caused by extreme weather events. This can include building levees to protect against flooding, improving water supply networks to cope with drought, or designing buildings capable of withstanding storms.

*Economic Diversification.* Communities that heavily rely on a single industry or natural resource are more vulnerable to climate shocks. Economic diversification can help reduce this vulnerability by providing alternative sources of income and strengthening economic resilience.

*Ecosystem Management.* Healthy ecosystems play a crucial role in mitigating the effects of climate change by providing ecosystem services such as climate regulation, flood protection, and erosion control. Preserving and restoring local ecosystems can therefore contribute to strengthening territorial resilience.

*Community Capacity Building.* Involving local communities in decision-making and preparations for climate change can strengthen their resilience. This can include raising awareness of risks, training in adaptation measures, and establishing community support networks.

### *The importance of strengthening territorial resilience in the face of systemic crises*

Ecological challenges, the COVID-19 pandemic, the impact of globalization, and the constant and unlimited changes in territories, organizations, individuals, and ecosystems have reminded us that we are facing a complex and unpredictable systemic crisis.

Regions, including territories, are increasingly exposed to growing threats and must adapt to an uncertain future. According to Tanguy and Charreyron-Perchet (2013), it is crucial to strengthen territorial resilience to help regions face crises and project themselves into a future that takes risks into account, while leveraging their assets and potential.

Resilience is not a philosophical concept, but rather a method or an operational practice of risk management and governance, according to economists. This idea is used by engineers, urban planners, and ecologists to address the challenges faced by ecosystems. Complex thinking proves to be an indispensable tool for dealing with these critical situations. The biggest challenge is to make this vast, vague, complex, and multidimensional idea practical. The idea of resilience, applied to regions, is relatively new. Indeed, this method has

been widely used in demanding scientific fields (such as engineering, chemistry, and ecology) for several decades. After a series of natural, economic, or social disasters, communities must invent new ways to adapt to these challenges by strengthening their resources and efforts to increase their resilience. The goal of integrating sustainable development frameworks and adapting to the challenge of global warming still seems distant. Only concerns about the protection of strategic infrastructure were taken into account. Issues related to the protection of individuals, poverty reduction, and sustainable development were completely ignored (Quenault, 2015). It involves integrating disaster management while considering the challenges of sustainable development, civil security, and the environment. This amounts to adopting an approach focused on risk prevention rather than crisis management.

The Sendai Framework for Disaster Risk Reduction (2015-2030) did not receive unanimous agreement, but it nonetheless highlighted the technical aspect of resilience. It defines resilience as the ability of a system, community, or society to face, mitigate, accommodate, and remedy the consequences of a threatening event, while maintaining and, if necessary, rebuilding its vital components and essential functions. The term “territorial resilience” is gaining popularity in the field of geography, but it also applies to all areas of social and economic life. This concept encompasses regions and their communities, in addition to the public and private institutions that participate in them. It is important to keep in mind that resilience takes various forms. It is divided into two distinct categories: static and dynamic.

Territorial resilience represents the ability of a place to adapt to external factors that affect the mechanisms of wealth generation at the local level. This ensures its prosperity, economic dynamism, and integration into a broader geographical area. The exploitation of this potential is manifested through the evolution of tools that allow individuals to align, create, and innovate together. This aspect is often associated with the concepts of collaboration, networks, hubs, or even communities (Bonnet, 2010; Cooke *et al.*, 2012). This aspect emphasizes the distinction between static and dynamic resilience, as defined by Hamdouch and colleagues (2012). Thanks to their resilience, regions can regain a certain balance once they have overcome the disturbances that affected them (Dauphiné, 2007; Christopherson *et al.*, 2010; Pike *et al.*, 2010; Simmie, Martin, 2009). Through their resilience, they escape the spatial grip that usually limits their potential for change (Baudelle, Pinchemel, 1986). In other words, the observation of static resilience does not necessarily guarantee an immutable territory, incapable of evolving or transforming. On the contrary, it is at the heart of a dynamic vicious circle, according to the state of the framework.

Secondly, there is another aspect of territorial resilience, which corresponds to the ability of certain individuals to discover and exploit new resources, skills, or values, while continuing to use existing, traditional, or inherited resources. This ability allows them to automatically integrate into a virtuous dimension. In this perspective, resilience is intrinsically dynamic (Hamdouch *et al.*, 2012). This form of resilience corresponds to the ability of territories to adapt (or even learn, transform, or rebuild) in the face of changes in their environment, as well as their resilience to external shocks (Christopherson *et al.*, 2010; Pendall *et al.*, 2010; Pike *et al.*, 2010).

According to Simmie and Martin (2009), certain territories seem able to constantly and sustainably adapt to the mutations affecting them. Resilience is a two-dimensional concept (static vs. dynamic), that is essential to its understanding. It is not limited to the spatial and temporal dimensions of the event in question or its consequences (Hamdouch *et al.*, 2012). One of its key characteristics is integration, which strengthens social solidarity and ensures the overall balance of society. Therefore, all actors must be engaged. This ensures the sustainability of regional resilience.

#### *Enhancing territorial resilience through proactive adaptation and intelligence*

To sustain high performance in an unpredictable environment, territories must be capable of continuous, proactive adaptation. This resilience mechanism plays a vital role in reducing vulnerabilities and strengthening adaptive capacities (Kone, 2021). The actors within a community are at the core of these systems, with territorial resilience being contingent upon their actions.

Despite the complex governance structure involving multiple stakeholders, data is readily available but remains fragmented, partial, and dispersed. This makes it challenging to filter and utilize relevant information for decision-making (Moisson *et al.*, 2010). Therefore, it is crucial to design and manage initiatives directly within the regions. Territorial intelligence presents a solution to these issues by fostering a learning environment conducive to local development through the broad dissemination of knowledge (Bertacchini, 2007).

Regional observatories serve as tools that support resilience, contributing to territorial intelligence by acting as bridges between knowledge and governance. Their primary objective is to improve territorial resilience by promoting and highlighting this concept. By focusing on resilience, these observatories offer valuable long-term insights into territories, enabling better crisis management and the ability to understand, adjust, and mitigate future impacts. According to Moisson and colleagues (2010), regional observatories serve three essential functions: providing crucial spatial data for local project de-



velopment, ensuring the implementation of these projects, and fostering dialogue and collaboration among stakeholders. These observatories are part of a growing range of tools aimed at disseminating and sharing information.

The term “observatory” can vary in meaning depending on the field. It may focus on specific topics like hazards or ecology, or concentrate on particular geographical areas, such as countries, regions, or cities, often linked to specific projects. Regardless of their focus, the primary goal of these observatories remains the same: to collect, analyze, and share data with the relevant territorial stakeholders. As De Sède-Marceau and colleagues highlight, in a world driven by globalization, territories and the populations within them are undergoing rapid changes due to political, ecological, demographic, geographical, and structural shifts. These fast-paced changes demand extensive data and analysis to understand the complex systems within territories (Serre, Heinzlief, 2018). Territorial observatories are instrumental in addressing technical issues, such as information exchange for development, and can serve as valuable tools for enhancing local resilience.

Observatories are designed to accurately represent territorial and social changes by collecting primary data through direct observation, which is then rigorously analyzed. This process allows them to decode, quantify, and use the gathered data to deepen their understanding of territorial transformations. With an analytical model that explores the various levels and connections within the data, users can gain deeper insight into the interactions and changes occurring. The observatory begins with concrete observations, which are then used to generate knowledge. These observatories are invaluable tools for supporting decision-making processes, disseminating new knowledge across different levels. Various engagement and communication techniques – such as simulation, mapping, indicators, alerts, comments, and discussions – make territorial observatories ideal tools for assisting decision-makers in ever-changing environments. These observatories play a crucial role in the development and success of territorial resilience.

*Moroccan strategic objectives and the territory's capacity to rebound.* Moroccan cities, in alignment with the national strategy for increased decentralization, are committed to ambitious goals. This is evident in the regions of Casablanca-Settat and Tangier-Tetouan-Al Hoceima, considered the engines of national development. The Casablanca region aspires to become a “smart metropolis” and the leading financial center in Africa, while the Tangier region hopes to become a prime destination for business travel and vacations. However, their desired future is challenged by the constant threat of floods, testing their resilience.

The Ministry of National Territorial Planning and Urban Policy has launched a national action plan to strengthen territorial resilience. This plan

aims to anticipate and mitigate the risks faced by territories by evaluating them comprehensively. It is important to consider how this national plan is implemented at the local government level. How is resilience addressed at the regional and local community levels? What are the challenges and opportunities in establishing a local resilience strategy involving all territorial actors?

*Sudden and repeated floods.* The Kingdom of Morocco is unfortunately not immune to this scourge. Recurrent floods hinder the development of affected regions. According to an OECD study, the country has experienced no fewer than 35 floods over the past 60 years.

Moreover, in the past three years, several cities have suffered from floods following heavy rains, causing significant material and human damage, amounting to 2.25 billion dirhams (2.25 million euros). For example: Taroudannt in 2019 (7 deaths); Tangier in 2021 (24 deaths); Casablanca in 2021 (1 death); and Tetouan in 2021. These events are mainly attributable to the outdated sanitation infrastructure in cities, as well as poor monitoring of climate change-related risks.

### *The New Development Model in Morocco: a vision for regional integration and sustainable growth*

The New Development Model (NMD) proposes to establish a model of regional integration and local dynamics by relying on financial, human, and natural resources specific to the regions. It aims to develop new modes of territorial governance that promote complementarity between the State and the regions, the emergence of integrated economic systems, and the planning of space and living areas, while preserving natural resources. The NMD has set three objectives to be achieved by 2035: firstly, to increase the proportion of desalinated water and treated wastewater in total water consumption to 15%; secondly, to improve the multidimensional local development index to 0.85; thirdly, to increase the share of renewable energy in total energy consumption to reach 40% by 2035.

To achieve these objectives, the NMD has proposed different measures. First of all, a reform of state administration, an improvement in the skills of local actors, and an acceleration of the advanced regionalization process, with genuine decentralization and the removal of obstacles hindering its progress. Then, an integrated territorial planning, focused on improving the standard of living (housing, connectivity, mobility) through: urban planning focused on the quality of the living environment and on social and functional diversity, breaking away from the current mode of management by exemptions; public transport as a basic public service, prioritized and strengthened by national and local public funding; strengthening access to housing through a housing

policy that encourages social diversity and reinforces socio-economic integration, while optimizing the use of public resources; accelerating the digital integration of territories to promote participation and improve access to public services, particularly in remote areas, through the rapid expansion of infrastructure in all territories. Finally, protecting natural resources, particularly water, and strengthening resilience to climate change.

In Morocco, the participation rate of women in economic activities is one of the lowest in the world: 21.5% compared to 71% for men, while the global average is estimated at 49% for women (HCP, 2021). As for young people, the unemployment rate for those aged 15-24 increased from 24.9% in 2019 to 31.2% the following year (HCP, 2020). At the same time, the country faces significant environmental challenges. The AMAL project aims to revitalize rural areas through the active participation of young people and women in the economy and ecological transition by pursuing three main objectives: to develop an egalitarian and eco-responsible culture to facilitate the development of a green and inclusive economy; strengthening the commitment of Local Authorities and Administrations in the development of a green and inclusive economy; to promote the emergence and consolidation of green or digital economic initiatives, particularly those led by women and young people.

### *Suggestions and conclusion*

Based on the previous observations, here are some recommendations and suggestions for strengthening territorial resilience.

First of all, to equip the territory with technologies to collect data and issue early and reliable warnings, similarly to what is done in Helsinki. The Finnish capital has developed technology to assess flood resistance. This technology can analyze precipitation and predict floods by identifying vulnerable areas of the city. Secondly, territorial governments should develop local resilience strategies through a consultative approach involving all stakeholders (elected officials, municipalities, ministries, water treatment companies, civil society). Thirdly, to raise citizens' awareness of risk culture, both before and during a crisis. For example, first aid courses in school curricula, as well as information on the best ways to prevent natural disasters, particularly floods. In addition, it seems crucial to conduct an empirical study in partnership with local authorities to analyze these limits and challenges. This approach would help us better understand and overcome obstacles to developing sustainable local territorial resilience strategies. Ultimately, we are convinced that the design of territorial resilience strategies must consider the specificities of each region. For local authorities, this implies establishing territorial governance involving all local actors. Beyond specific threat management, this represents

a sustainable asset and advantage: a lever to strengthen resilience and achieve the desired objectives.

In conclusion, we can say that territorial resilience is a complex concept that requires concrete actions on the ground and a multidimensional approach, encompassing social, psychological, environmental, institutional, and technical aspects, as well as an in-depth knowledge of the natural and social history of each territory. Territorial observatories, with their decision-support tools, help centralize and organize dispersed information, thus facilitating collective action.

Territorial actors play a crucial role in implementing resilience by acting through cooperation, collaboration, and coordination, which are the main forms of partnerships within territories. Therefore, territorial resilience relies on the shared capacities and interactions of actors in addressing the sustainability challenges of projects through territorial observatories.

Indeed, the resilience of territories in the face of risks and changes tends to produce positive outcomes, ensuring at least stability, without ever leading to environmental, economic, or social degradation. In this context, it is relevant to question the existence and role of such territorial observatories within the framework of new development model projects in Morocco, particularly in the agricultural sector, marked by the establishment of new projects.

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**Parole chiave:** Resilienza territoriale, cambiamento climatico, adattabilità, sfide ecologiche, Marocco

**SUMMARY** – Territorial resilience is a crucial concept for managing climate and socio-economic risks. It is based on collaboration between local actors and active community involvement; it embraces economic, social, environmental and institutional dimensions. Key strategies to promote resilience include risk assessment and the adoption of effective governance. The case of Morocco allows these interdependencies and strategies to be considered.

**RÉSUMÉ** – La résilience territoriale est un concept crucial pour la gestion des risques climatiques et socio-économiques. Elle repose sur la collaboration entre les acteurs locaux et l'implication active des communautés ; elle englobe les dimensions économiques, sociales, environnementales et institutionnelles. Les stratégies clés pour promouvoir la résilience comprennent l'évaluation des risques et l'adoption d'une gouvernance efficace. Le cas du Maroc permet d'examiner ces interdépendances et ces stratégies.

**ZUSAMMENFASSUNG** – Territoriale Resilienz ist ein entscheidendes Konzept für den Umgang mit klimatischen und sozioökonomischen Risiken. Es basiert auf der Zusammenarbeit zwischen lokalen Akteuren und der aktiven Beteiligung der Gemeinschaft; es umfasst wirtschaftliche, soziale, ökologische und institutionelle Dimensionen. Zu den wichtigsten Strategien zur Förderung der Resilienz gehören die Risikobewertung und die Einführung einer wirksamen Governance. Am Beispiel Marokkos lassen sich diese Interdependenzen und Strategien betrachten.

**RESUMEN** – La resiliencia territorial es un concepto crucial para gestionar los riesgos climáticos y socioeconómicos. Se basa en la colaboración entre los agentes locales y la participación activa de la comunidad; abarca dimensiones económicas, sociales, medioambientales e institucionales. Las estrategias clave para promover la resiliencia incluyen la evaluación de riesgos y la adopción de una gobernanza eficaz. El caso de Marruecos permite considerar estas interdependencias y estrategias.

JIHANE ELLOUITY\*, MOHAMMED EL AKLAA\*

Impact of climate change on agriculture in the downstream of Tassaout Valley: challenges and migration perspectives

*Impatto del cambiamento climatico sull'agricoltura nel basso corso della valle di Tassaout: sfide e prospettive di migrazione*

### *Introduction*

Recent research has paid particular attention to the effects of climate change on human mobility. Various studies demonstrated links between drought, land degradation, and migration. Although traditionally attributed to economic and social factors, migration is now recognized as being influenced by climate change (Ellouity, 2024).

Agriculture, the most affected sector, is a key channel through which climate impacts are manifested. The decline in agricultural productivity due to rising temperatures and irregular rainfall pushes rural populations to seek better opportunities elsewhere (McLeman, 2014). This phenomenon is particularly concerning in developing countries, where agriculture is the primary source of income.

From a scientific standpoint, it is well established that the frequency and intensity of future droughts will be largely determined by greenhouse gas emissions. According to the Intergovernmental Panel on Climate Change (IPCC), global temperatures are expected to increase up to 4.8°C by 2100, leading to increased aridity and land degradation (Badraoui, Balaghi, 2012).

Adaptation to climate change thus becomes a priority for farmers and relies on technological solutions, water resource management policies, and economic diversification strategies. However, adaptation efforts are limited by financial and institutional constraints (Mortreux, Barnett, 2009).

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The transfer of technologies from developed to developing countries is a crucial issue in promoting the emergence of innovative solutions. To achieve this, an effective cooperation framework to overcome economic and political barriers is required (Ben Ali, 1996).

In conclusion, the resilience of rural populations to climate change will depend on their ability to adapt and capitalize on available innovations. An integrated approach involving both local and international actors is essential to ensure sustainable agricultural development.

### *Problem and Hypotheses*

Climate change has become a major challenge for humanity, severely impacting ecosystems and economies. Morocco, despite having low greenhouse gas emissions, is particularly vulnerable due to the scarcity of its water resources. This vulnerability is reflected in reduced rainfall and increased periods of drought, directly affecting agricultural productivity and threatening social stability, particularly in the Haouz plain (Pascon, 1983).

In the Lower Tassaout region, agriculture is primarily traditional and dependent on rainfall, making it highly vulnerable to the effects of climate change. The growing scarcity of water worsens the living conditions of farmers, encouraging migration flows to more prosperous areas, particularly to Europe, with Italy being a key destination. This migratory phenomenon, which began in the 1970s and 1980s during periods of severe drought, highlights the interdependence between climate change, agriculture, and migration (Magnan, 2009).

The main problem is to understand how climate change impacts agriculture and contributes to forced migration. Key research questions include: What are the climate change indicators in the Lower Tassaout? How does climate change affect agricultural parameters in the region? How do these impacts influence agricultural productivity and migration? Are current adaptation strategies sufficient to address these challenges?

We hypothesize that climate change and migration are interdependent challenges. Climate change has significant impacts on the local population, with the decline in agricultural productivity being a key factor influencing migration. We also hypothesize that farmers' adaptation capacities are limited, as innovation and technology transfer are essential for effective adaptation.



## *Methodology*

The methodology adopted for this research is structured around two phases aimed at answering the research questions and validating the proposed hypotheses.

1. Exploratory phase:
  - This step involved defining and framing the research problem through an in-depth literature review.
  - The goal was to position the topic within relevant disciplinary fields and structure the analysis based on existing knowledge.
2. Practical phase:
  - Choice of study area: selection of agro-climatic zones marked by significant migration flows to confront the problem and hypotheses with real-world data.
  - Identification of climate and agricultural indicators: analysis of the effects of climate change on agriculture by collecting data on climate dynamics and agricultural yields.
  - Survey of agricultural households: collection of socio-economic and demographic data from farming households to assess the impact of climate change on the local population. This survey also helped to understand farmers' perceptions of climate change and their willingness to adopt adaptation solutions.
  - Interview guides: conducting targeted interviews with stakeholders involved in the management of the regional agricultural sector, and migrants who left the study area for Italy, to understand the motivations and impacts of migration.

## *Presentation of the Study Area*

The perimeter of the Lower Tassaout Valley is located in the El Kelaâ des Sraghna Province, on both sides of the Tassaout River (Fig. 1). It spans an area of 72,000 hectares, of which only 43,756 hectares are irrigated through a gravity-based irrigation system that covers most of the 72,000 hectares. The perimeter includes five sectors (Tab. 1).



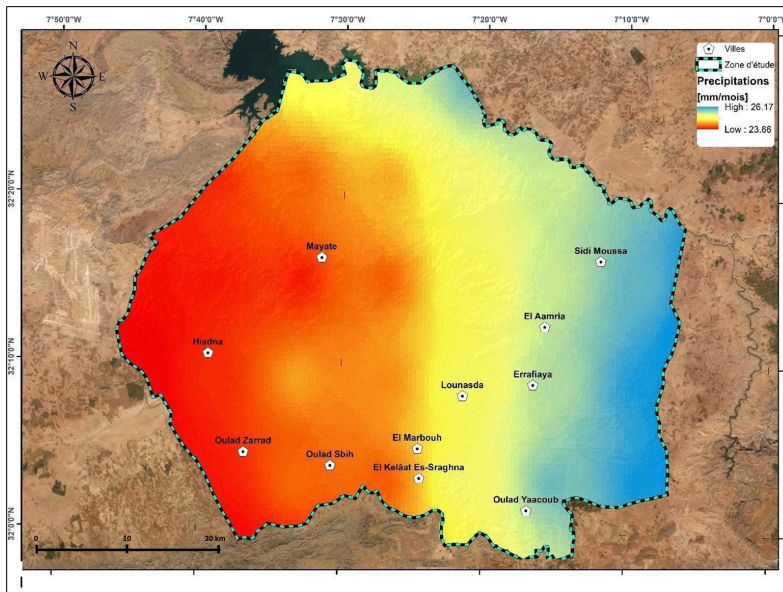
### *Analysis of Rainfall Series and Annual Temperature Trends in the Lower Tassaout Valley*

Based on the linear trend curve in Fig. 3, a decrease in annual precipitation is observed, with an annual reduction rate of 1.9 mm. The wettest year was 1996, with a precipitation value of 400 mm, while the driest year was 2009, with a precipitation value of 0 mm. A persistent rainfall deficit has been observed in the Tassaout Aval on an annual scale, despite a slight increase in precipitation observed at the end of 1994 and the beginning of 1998, with a maximum of approximately 400 mm. Additionally, Fig. 2 shows that average annual temperatures exhibit an increasing linear trend with a rate of 0.014 °C. The hottest year was 2017, with an average annual temperature of 20.7 °C, while the coldest year was 2018 (18.17 °C) (Haouz Regional Agricultural Development Office).

Regarding extreme temperatures between 1988 and 2019, it was found that, on average, maximum temperatures ranged from 20 °C to 21 °C, and minimum temperatures increased from 18.3 °C to 18.6 °C, with an exceptional low recorded in 2018, where the average value was 18.1 °C (Haouz regional agricultural development office).

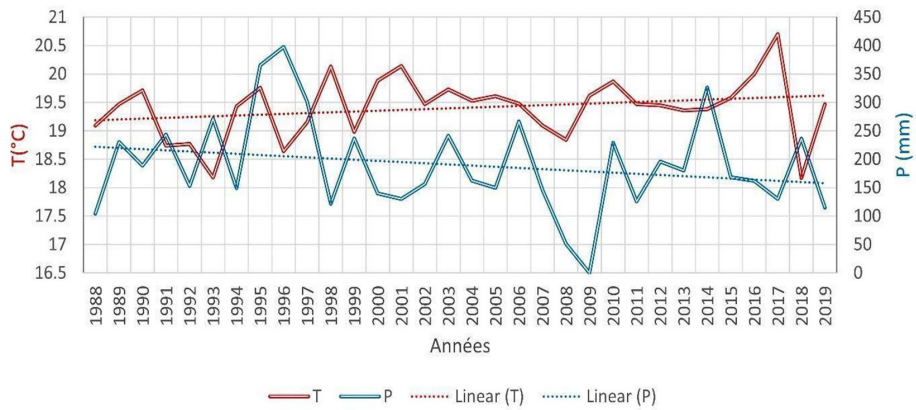
Overall, temperatures remain high but vary from year to year. Interannual temperature variations show a consistent upward trend throughout the period 1988-2019, except for a few years, specifically between 1991 and 1993, in 2008, and in 2018.

Fig. 2. Climatic Map (Precipitation) of the Tassaout Aval



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES Airbus DS. USDA, AeroGrid, IGN, and the GIS User Community.

Fig. 3. Annual Precipitation and Temperatures downstream of Tassaout Valley (1988-2019)



Source: personal elaboration from Haouz Regional Agricultural Development Office data.

*Farmers' Perception of Climate Variability.* Farmers' meteorological perceptions in the Tassaout Aval regarding current climate change are based on local knowledge drawn from lived experiences to explain and understand the recent climate evolution. Based on a survey of farmers, the findings show that they clearly perceive the effects of climate change, which manifest as modifications in the biophysical and hydrological environment. Indicators of these changes include irregular rainfall, recurrent drought periods, significant disruptions in the duration of the different seasons of the year and sowing periods, the disappearance of temporary water sources, the degradation of plant resources, and decreased yields. A decrease in precipitation is perceived by 74.6% of farmers in the Tassaout Aval area. They report a decline in total rainfall and a noticeable warming trend: 74.6% of farmers believe that rainfall amounts have recently decreased. The interpretation of ethnometeorological data indicates a declining rainfall trend, moving towards aridification. The majority of farmers believe that in the 1990s, temperature intensity was lower compared to the last few decades. Indeed, they consider that its intensity has increased over the years. The analysis of farmers' responses reveals the perception of an evolving warming trend in the climate of the study area between 1988 and 2019 (Fig. 2).

### *Constraints and Shocks Related to the Effects of Climate Change*

The consequences of climate change on the rural population in Tassaout Aval are numerous. The surveyed households live in a vulnerable situation, characterized by various shocks that have significantly impacted their living conditions in recent years. The multiplicity and complexity of these shocks further exacerbate poverty and directly affect development in the area. Through our field survey, we identified the main shocks and classified them into three categories: economic, social, and environmental.

*Economic Shocks: Impacts on Agriculture and Income.* The economy of the Tassaout Aval is mainly based on agriculture, with 87% of the population deriving their income from it. In the Bour area, more than 50%, and even up to 75%, of the economy is composed of livestock products. However, the severity of the drought has turned the agricultural sector into an imbalanced one. Indeed, agricultural seasons have been marked by prolonged periods of drought, primarily manifested as water deficits, which significantly complicate farmers' adaptive measures. These effects are even more severe since production is closely tied to water availability (Haouz regional agricultural development office).

Periods of climatic drought have exacerbated the productive, cultural, and livestock deficits. Indeed, cereal production has experienced a significant decline, especially in the Bour area, even before agricultural development took place. Between 1976 and 1982, the area dedicated to cereal cultivation decreased by 42%, reducing the profitability of abandoned lands, even during wetter periods.

Shrub crops, however, are less affected. Despite efforts to support the sector, particularly in hydro-agricultural infrastructure, the region's potential remains underexploited for various reasons. The main one refers to the constraints of irrigated agriculture, linked to administrative difficulties related to land structure, supply, and marketing. Each sector also faces specific constraints.

The olive tree, the main tree crop in the region, represents a true development potential but is weakly exploited. The province of El Kelaâ des Sraghna has no less than 215,700 hectares of olive groves, representing 20% of the national total. The quality of products derived from olive groves should be an asset for the development of the area. In terms of production, the sector is present in both industrial and traditional units (*mâasras*). The former are characterized by monopolization, while the latter is characterized by low economic yield. There are very few *mâasras* and they face challenging specifically related to marketing.



On the other hand, livestock production is also very fragile, because it depends on the expansion of practices and low productivity. Despite efforts to mitigate deficits in animal feed, farmers have resorted to crop by-products at the expense of forage crops, such as alfalfa, dry beet pulp, hay, and straw.

The government subsidized animal feed as part of drought mitigation efforts, which at least helped reduce this deficit. However, according to the farmers interviewed, the situation remains critical regarding livestock production. The consequences are directly felt on agricultural income, which constitutes the largest share compared to other sources of income. Agricultural income, the main source of revenue, remains low and has been decreasing over the years, thus not fully meeting farmers' needs. More than 85% of those surveyed reported a decreasing trend in their agricultural income. This income barely covers basic living expenses, leaving no room for savings. In most cases, agricultural income does not allow for savings or encourage investment.

*Social Shocks: Migration and Social Effects.* The effects of climate change have been severe at the social level in the Tassaout Aval region. Drought has accentuated spatial and social disparities, accelerating the process of exodus towards other agricultural regions, urban centers, or international migration.

The history of mobility and migration in the Tassaout Aval is not recent. Indeed, the drought that struck the area since the 1980s has severely impacted farmers. To cope with the shocks and reduce vulnerability, households developed several adaptation strategies. The most notable of these are emigration and diversification of income sources through small trade. According to Louhmadi's study conducted on 6 representative villages in the study area, an emigration rate of 43% was found (Louhmadi, 1987). Our fieldwork confirmed these earlier findings on migration, adding other explanatory factors to the current social situation. Although drought is the primary driver of this massive emigration, other complementary factors include poverty, unemployment, and lack of education.

The geographical location of the area exposes it to irregular rainfall, which the population adapted to through seasonal movements. However, the repeated droughts of the 70s and 80s eventually led to the increasing precarization of agricultural households.

In the Tassaout Aval region, poverty is an indicator of the critical social situation in the area. It refers to relative deficiencies in monetary income, access to decent housing, education, and healthcare. Vulnerability is persistent, with deep-rooted rigid social structure and harsh climatic conditions. As a result, physical mobility has become the most prevalent alternative. The region is depopulating, with migration initially directed toward more developed interior areas and later towards external migration.

This migration dynamic has restructured relationships within agricultural households. The departure of men from the region has led women to take roles and responsibilities traditionally assigned to men. The lack of agricultural labor may force women to lease the agricultural land, a practice that was once socially unacceptable, ultimately leading to the decrease in household production. Indeed, the activities of men and women differ in what the social hierarchy defines gender-specific roles that are accepted and respected by community members. Women's work is rooted in the reproduction sphere and has no market value. Activities developed beyond the family context supplement the men's income. Men are expected to carry out productive work that generates income for the household survival. Migrants contribute to financing the household's needs as much, if not more, than men who remain in the village. However, the lack of agricultural labor in the area due to waves of migration contributes to the intrusion of women into the productive space which was traditionally reserved for men.

*Environmental shocks: water deficit and desertification situation.* As Bilen mentioned, the characteristics of the rainy season determine sowing periods and significantly affect the timing of input applications, the crops' water absorption capacity, and, consequently, the agricultural production. Thus, this suggests a positive correlation between agricultural production and water availability. All the surveyed farmers agreed on a single major environmental shock they had experienced. Water scarcity in the Tassaout Aval region is not a recent phenomenon, as the area has experienced several periods of drought since 1976. For decades, droughts have had direct impacts on surface water resources. The 1982-1983 agricultural campaign was marked by a very severe drought and a chronic rainfall deficit, which reached more than 71% compared to a normal year. For example, during the 1980-1981 agricultural campaign, the reserves recorded at the start of the season were at 124 mm<sup>3</sup>, which were used to provide normal flows during the planting period. However, this situation changed abruptly by the end of February. The deficit reached 47% compared to the average flows of the period, which significantly impacted supply regularization: only 69 mm<sup>3</sup> stored instead of expected 129 mm<sup>3</sup>. The recorded precipitation deficit was 64 mm, representing a negative rate of 41%. The situation became even more alarming the day before the following season, when the reservoir reached its extreme level with a rate of 120 mm<sup>3</sup>. The drought also impacted underground aquifers, leading to a significant decline in farmers' water table level.

*Perspectives for agricultural development and the transition to climate-smart agriculture in the Tassaout Aval*

Given the situation described in the previous chapters and considering the drought context that has become a structural challenge, it is necessary to implement a change in the agricultural policy. Adapting agriculture to climate change in Morocco, and particularly in the Tassaout Aval region, is therefore crucial to address these challenges effectively. Several actions have been highlighted to support agricultural productivity, but they remain limited. There is the need for innovation, particularly in terms of reforms, strategies, action plans, as well as public and territorial policies to tackle these different challenges, especially those of a social nature.

Innovation in agriculture has become essential and is currently a focal point of key stakeholders in the sector, given the significant potential benefits that can be derived, particularly in terms of adaptation to climate change. It is necessary to rethink innovation to anticipate multiple social issues and find innovative and radical solutions, linked to sustainable development, promotion of the agricultural sector, and the improvement of social conditions for the most marginalized and hardest-hit populations.

*The Green Generation 2020-2030: Towards Innovative Sustainable Agriculture.* The Green Generation 2020-2030 is a strategy adopted by the public authorities at the beginning of 2020, aiming to consolidate the achievements of the past ten years, while prioritizing the human element. The goal is to create an agricultural middle class capable of playing a significant role in the socio-economic stability of rural areas. The strategy is based on two main pillars: the human element and the continuation of the agricultural development dynamic, as well as preparing the conditions for the emergence of a new generation of agricultural middle class. This is achieved by improving the income of households involved in the agricultural sector, ensuring social protection, and expanding the targets of agricultural insurance to protect farms from the impacts of climate change.

The first pillar, which prioritizes the human element, is based on four specific axes with the following objectives:

- Contributing to the emergence of a new generation of agricultural middle class.
- Creating a new generation of young entrepreneurs, particularly through the mobilization and development of 1 million hectares of collective lands and the training of 150,000 young people in agricultural and para-agricultural services.
- Creating innovative new-generation agricultural organizations.



- Establishing a new generation of support mechanisms by connecting at least 2 million farmers to digital service platforms and fostering the emergence of 5,000 private agricultural advisors to guide farmers.

The second pillar concerns the sustainability of agricultural development through specific actions in production sectors, distribution circuits, and the preservation of natural resources in the context of climate change. It is also based on four axes:

- Consolidating agricultural sectors.
- Improving and modernizing agricultural product distribution circuits.
- Improving quality and innovation capacity.
- Establishing a more resilient and eco-efficient agriculture.

This strategy also aims to encourage farmers to invest more, improve the working conditions, and reduce the gap between the Guaranteed Minimum Agricultural Wage (SMAG) and the Guaranteed Minimum Interprofessional Wage (SMIG). The strategy aims at the development of agricultural sectors to double the agricultural GDP and exports, while maintaining investment efforts, streamlining support, and providing assistance.

The competitiveness of Moroccan exports will be enhanced by accelerating and valorizing the transformation of agricultural products, as well as qualifying certain high-potential sectors. The strategy also focuses on modernizing irrigation, promoting public-private partnerships (PPPs) in irrigation, and adopting water-efficient techniques with the goal of doubling water use efficiency per cubic meter. This optimization of water resources will be complemented by the promotion of renewable energy in this field, supporting the transition of farmers towards renewable energy sources.

Innovation, quality, and green technology are at the heart of policymakers' concerns. Generation Green places significant emphasis on improving production quality, adapting it to agricultural and technological trends, as well as new consumption patterns, which will allow Morocco to align with international standards and meet the expectations of both Moroccan and foreign consumers.

Investments in research and development will be increased by 1.5 to 2 times to better disseminate innovations and agro-tech principles. This will allow the inclusion of 30 to 50 new varieties in the official catalog. Agricultural digital services should cover areas such as traceability, advisory services, marketing, mobile payments, and agricultural insurance. Farmers will be able to fully integrate Agri 4.0, which ensures the sustainability of resources.

*The New Development Model: Innovation and Research for a More Efficient Moroccan Agriculture.* The Special Commission on the New Development Model (CSMD), appointed by His Majesty King Mohammed VI, prepared and presented the New Development Model (NDM) in 2021. The

NMD outlines the framework of a new model that defines a national ambition and proposes a credible and achievable path for change in Morocco, based on a clear and honest diagnosis, a forward-looking approach, and a broad citizen listening exercise. Falling within the existing constitutional framework, the NMD aims to «serve as a reference to stimulate debate on the Nation's development priorities and facilitate the convergence of all actors' actions around common objectives and shared approaches – while respecting the roles, responsibilities, and areas of action of each» (The Special Commission on the New Development Model, 2021).

In the NMD, the CSMD pointed out the need to implement specific and urgent reforms to make the agricultural sector more efficient and competitive, highlighting the importance of innovation and research in addressing its challenges. The agricultural sector is one of the sectors needing urgent attention, according to the CSMD, both due to its potential and the constraints that may hinder its development. The head of the FAO also emphasized the role of science and know-how in this New Development Model, noting that it involves a prosperous Morocco that creates wealth and quality jobs, and regional leadership in well-targeted areas.

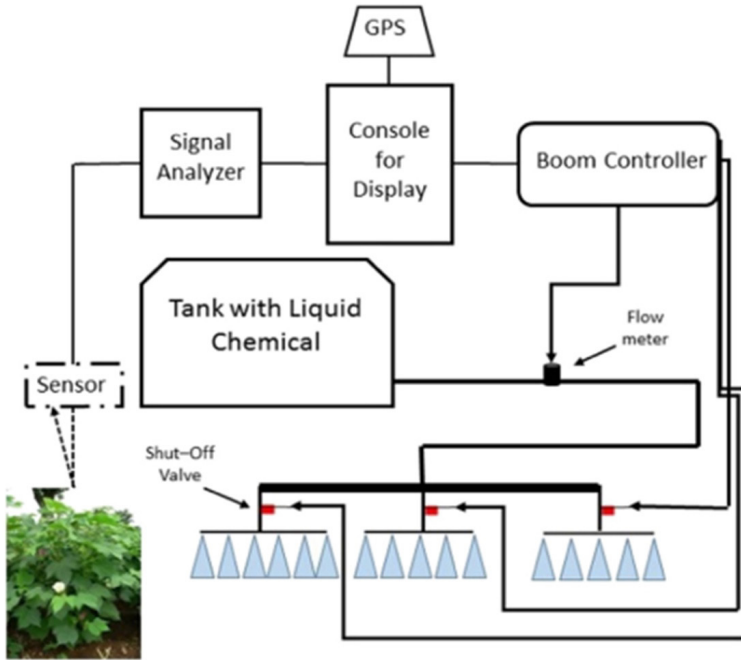
### *The Adoption of Innovations in Agriculture: Agro-Climatic Information as a Transitional Step Towards “Smart” Agriculture*

Numerous studies show that agricultural and climatic information is increasingly integrated into farmers' decision-making processes worldwide, as it was a key step in adopting new technologies in agricultural production. Indeed, the principle of smart agriculture is the optimization of productive resource use (such as inputs, water, etc.) in agriculture at the “right time” and in the “right place”, while considering the environmental specificities of the given area. The usefulness of agro-climatic information will therefore allow the farmer to respond more rationally and attentively, while also acquiring the basic skills needed to successfully transition to smart agriculture.

The advantage of sensor-based VRA (Variable Rate Application) is that it does not require maps or the use of GPS antennas. However, farmers who can integrate sensor-based VRA with GPS technology benefit from the storage of application data and physical coordinates. The data is valuable not only for future site-specific crop management activities, but also for creating prescription maps for other operations (Fig. 4).

One of the disadvantages of sensor-based VRA is defining response functions, which link the sensor index to the input rate. Another disadvantage is that applicators must adjust flow rates very quickly, as the input rate varies in real time. The time needed for applicators to change the flow rates, called

Fig. 4. Example of an application based on a liquid input sensor



Source: Agricultural Internet of Things and Decision Support for Precision Smart Farming, Chapter 5.

latency time, is generally over 3 seconds, which means that the distance between the sensor and the actuator, at a speed of 10 km/h, must be more than 8 meters. However, this connection distance between the sensor and actuator is too large. Lastly, another disadvantage is the complexity of tasks related to sensor-based VRA, such as automatic detection, modeling, and control.

### *Internet of Things (IoT) and Internet of Services (IoS) in Agriculture*

IoT and IoS refer to the use of devices and systems to collect real-time information in order to form a network system with the Internet. The goal is to connect the network and objects, the network and people, and the network and services. As a result, the system can achieve better performance in terms of execution, identification, and management. The emergence of IoT allows us to design and implement a system model that connects isolated subsystems together.

IoT and IoS are also used in agriculture. Researchers have developed a CPS framework called MDR-CPS, which utilizes IoT and IoS concepts to monitor early plant stress conditions in greenhouses. This design has relatively better performance in terms of detection rate, tolerance to conflicts and errors, and response time to unexpected situations. Given the vulnerability of the agricultural sector to the effects of climate change, it is widely accepted that innovation is crucial to addressing the challenge of climate change adaptation in order to ensure food security, increase farmers' income, and reduce potential migration. Innovations are seen as adaptation strategies developed and implemented by international institutions, regional organizations, governments, and local actors (farmers, NGOs) to reduce vulnerability to climate change and boost agricultural production. Technological innovations that can be adopted by farmers include water and soil conservation techniques, the integration of agriculture and livestock, the use of improved varieties, and the Internet of Things.

The dissemination of these innovations is supported by several partners, including NGOs, research centers, and state agricultural service agents. All dissemination efforts are part of a national climate change adaptation plan (NAPA) in each country.

*Smart Agriculture: Supporting Sustainable Development, Agricultural Policies, and Addressing Migration Challenges.* Today, farmers are constantly trying to find alternative ways to reduce their production costs. Smart agriculture can bring added value in terms of benefits (yield, profit), reduce negative environmental impacts due to excessive use of inputs, or provide better animal welfare through improved management and decision-making.

The application of smart agriculture will change agricultural production techniques. This will require farmers to increase their education level to work with complex ICT tools and also maintain their on-the-ground knowledge that can help them make decisions. Smart agriculture will also play a very important role in supporting the expected objectives of the national sustainable development strategy and agricultural policies, particularly within the framework of the Green Generation, and will help fulfill the directives and goals of the High Authority.

### *Conclusion*

The significant impacts of climate change on the rural population in the Tassaout Aval region, highlighting three main types of shocks: economic, social, and environmental.

**Economic shocks:** the region's economy, heavily reliant on agriculture, has been severely affected by prolonged droughts, leading to decreased agricultural productivity and income. Despite efforts to support agriculture, constraints related to land structure, supply, and marketing persist, particularly affecting olive and livestock production.

**Social shocks:** climate change has exacerbated social disparities, leading to increased migration. Drought and poverty have driven many to seek better opportunities elsewhere, restructuring household dynamics and increasing the roles and responsibilities of women in agriculture.

**Environmental shocks:** water scarcity and desertification have been ongoing issues, with repeated droughts significantly impacting water resources and agricultural production. The correlation between water availability and agricultural output underscores the critical nature of this environmental challenge.

The importance of integrating agricultural and climatic information into farmers' decision-making processes to adopt new technologies and optimize resource use. Smart agriculture, which includes techniques like sensor-based Variable Rate Application (VRA) and the Internet of Things (IoT), aims to enhance productivity while considering environmental specifics.

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**Keywords:** Climate change, agriculture, forced migration, adaptation, Tassaout Valley  
**Parole chiave:** Cambiamento climatico, agricoltura, migrazione forzata, adattamento, Valle di Tassaout

**SUMMARY** – Climate change and migration are deeply interconnected. Rising temperatures, shifting precipitation, and climate shocks reduce agricultural productivity and cause land degradation and water scarcity in the Tassaout valley. This threatens rural livelihoods, leading to migration. The relationship is complex and shaped by socio-economic, political, and environmental factors. Evidence shows climate-induced agricultural shocks significantly increase emigration, a trend consistent across studies.

**RIASSUNTO** – Cambiamento climatico e migrazione sono strettamente legati. L'aumento delle temperature, le variazioni delle piogge e gli shock climatici riducono la produttività agricola e degradano suolo e risorse idriche nella valle di Tassaout. Questo minaccia i mezzi di sussistenza rurali e spinge alla migrazione. La relazione è complessa e influenzata da fattori socioeconomici, politici e ambientali. Studi confermano che gli shock agricoli indotti dal clima aumentano significativamente l'emigrazione.

**RÉSUMÉ** – Le changement climatique et la migration sont étroitement liés. La hausse des températures, les variations des pluies et les chocs climatiques réduisent la productivité agricole, dégradant terres et ressources en eau dans la vallée de Tassaout. Cela menace les communautés rurales et favorise la migration. La relation est complexe, influencée par des facteurs socio-économiques, politiques et environnementaux. Des études confirment que les crises agricoles liées au climat accentuent l'émigration.

**ZUSAMMENFASSUNG** – Klimawandel und Migration sind eng verbunden. Steigende Temperaturen, veränderte Niederschläge und Klimaschocks verringern die landwirtschaftliche Produktivität und verschärfen Boden- und Wasserknappheit im Tassaout-Tal. Dies bedroht ländliche Existenzen und fördert Migration. Die Beziehung ist komplex und wird von sozioökonomischen, politischen und ökologischen Faktoren beeinflusst. Studien bestätigen, dass klimabedingte Agrarkrisen die Emigration verstärken.

**RESUMEN** – El cambio climático y la migración están estrechamente conectados. El aumento de temperaturas, los cambios en las lluvias y los choques climáticos reducen la productividad agrícola y degradan el suelo y el agua en el valle de Tassaout. Esto pone en riesgo las comunidades rurales y fomenta la migración. La relación es compleja y está influida por factores socioeconómicos, políticos y ambientales. Estudios confirman que las crisis agrícolas por el clima aumentan la emigración.









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