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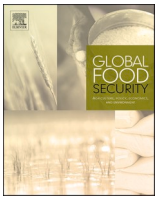
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# Nurturing gastronomic landscapes for biosphere stewardship

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ABSTRACT

As a result of years of increased rationalization and consolidation of food systems, the knowledge and skills of many actors in food value chains, especially those linked to smaller-scale traditional and artisanal production, processing, and cooking, have rapidly been eroded. Despite the resilience that such knowledge and skills can offer. In this paper, we use the lens of gastronomy to highlight how culinary craftsmanship and innovation hold potential to drive the development of biosphere stewardship that contributes to more biocultural, diverse, and resilient landscapes. We propose the concept of 'gastronomic landscapes,' i.e., land/seascapes that are governed, managed, or cared for to contribute specifically to culinary development while having substantive value for landscape resilience and food system sustainability. Through six cases representing different knowledge systems and landscapes across the world, the breadth of gastronomy and how it is linked to landscapes is highlighted. We develop a typology of characteristics that can be used to analyze gastronomic landscapes based on locality, diversity, and quality. In the paper, we conclude that thinking and acting in line with gastronomic landscapes can help build resilience and food sovereignty over time and offers a helpful conceptualization for further studies.

## 1. Introduction

### 1.1. Global food system challenges

Globally, food systems face significant challenges; declining soil fertility, changing climate, biodiversity loss, and unhealthy diets (e.g., Poore and Nemecek, 2018; Springmann et al., 2018; Willett et al., 2019). Some of these challenges are caused by the rapid rationalization and consolidation of food systems since the Green Revolution. The rationalization has succeeded in achieving food systems benefits, such as increasing farm productivity, keeping food prices low, and enhancing food security and stability in several instances (Porkka et al., 2013). However, the simplification and homogenization of food-producing land/seascapes, and with it, the loss of crop and animal diversity, has resulted in reduced food system resilience (Khoury et al., 2014; Nyström et al., 2019). The erosion of resilience became evident during various local and global events, such as the COVID-19 pandemic, increased extreme weather events such as droughts and floods, and the Russian invasion of Ukraine that resulted in disrupted food supply chains, food price increases, and increased food insecurity.

The rationalization of food systems has led to a consolidation and vertical integration along food supply chains, which has often left small and medium-scale producers and processors struggling (Clapp and Purugganan, 2020). In this process of rationalization, the appreciation for producers' and consumers' biocultural (e.g., interrelated biological, cultural, and linguistic values) skills, local knowledge, and management practices have diminished (Merçon et al., 2019; Antonelli, 2023). The change has largely been driven by the concentration of actors in the middle segment of the food value chain, along with rapid urbanization with people living further away from food production systems, and thus becoming both physically, mentally, and emotionally disconnected from their foods origin (Seto and Ramankutty, 2016; Clapp, 2015). The rationalization has also meant that the knowledge and skills of many smallholders, especially those linked to traditional and artisanal production, processing, and cooking, are rapidly being eroded, despite the resilience that such knowledge and skills could offer food systems in the

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face of social-economic and environmental changes (Brondizio and Le Tourneau, 2016). In addition, entrenched power dynamics and a lack of trust among food system actors, such as big corporations and alternative food system actors, can impede all actors' ability to support sustainable and healthy food systems (Pereira et al., 2020a). To contribute to addressing some of the tensions in global food systems, we propose focusing on gastronomy and its connection to stewardships of landscapes as one of many ways forward.

### 1.2. Gastronomy and food as a daily art can drive biosphere stewardship

Gastronomy is the practice or art of eating, choosing, and cooking good food. It involves the skills and competencies used when discovering, tasting, experiencing, researching, and understanding food. Whether through daily practices of home cooking or in restaurants - food production, processing, and cooking can be seen as a 'daily art' (Haider and van Oudenhoven, 2018). Brillat-Savarin (2009) highlights the interdisciplinarity that gastronomy encompasses as "the intelligent knowledge of whatever concerns (human's) nourishment (p.61)". Gastronomy is practiced by everyone who prepares food thoughtfully and motivates people, including farmers, hunters, and a wide diversity of cooks, to think about how food is produced and prepared (Brillat-Savarin, 2009). Gastronomy embodies relationships among humans who prepare food, and the diversity of animals, plants, and other organisms that give rise to life on the planet, providing the ingredients for cooking. It includes relationships among humans and 'more-than-humans' (Donati 2022) exemplified in how humans and microbes collaborate in fermentation processes.

Appreciating high quality - in terms of healthy and sustainably produced, diverse, and nutritious ingredients in kitchens - can stimulate an interest in stewardship of land/seascapes that generate the produce essential to gastronomy. Stewardship of land/seascapes and the biosphere at large, incorporates economic, social, and cultural dimensions to shape and safeguard the biosphere's resilience for human well-being and foster sustainability of a rapidly changing planet (Chapin et al., 2010, 2022). Stewardship involves looking after and cultivating a sense of belonging in the biosphere where care, knowledge, and agency are central elements (Peçanha Enqvist et al., 2018). It applies to local people, their environments, and to the stakeholders who act in relation to the planet as a whole (West et al., 2018; Plummer et al., 2020). Biosphere stewardship has the potential to create meaning and build respect and dignity for the competencies and skills needed in managing landscapes and their resilience (Folke et al., 2016), including food wisdom (Juri, 2023) and food systems literacy (Widener and Karides, 2014; Rosas et al., 2022).

In this paper, we propose the concept of 'gastronomic landscapes', defined as land/seascapes (including rangelands, forests, rivers, wetlands, urban gardens, and coastal zones) that are governed, managed, or cared for to contribute specifically to culinary development. What distinguishes a gastronomic landscape from a conventional food producing landscape is that it is nurtured and/or managed specifically for broader culinary values, for example nutrition or taste, rather than just the caloric value of its produce. Gastronomic landscapes are developed from the practice, art, skills, and competencies needed for producing, selecting, and cooking good quality food. They depend on stewardship capacity, including managing the landscapes where the produce comes from, as part of a resilient biosphere (Folke et al., 2011). By using the lens of gastronomy in understanding landscapes, we highlight how culinary craftsmanship, tradition, and innovation, from cooks in local communities to chefs of leading restaurants, have the potential to drive the development of biosphere stewardship that leads to more biocultural, diverse, and resilient landscapes (Kremen and Merenlender, 2018; Merçon et al., 2019).

## 2. Identifying gastronomic landscapes that enhance biosphere stewardship

We present six cases of gastronomic landscapes that contribute to biosphere stewardship. Here, culinary development and biosphere stewardship work together to enhance the experience of eating, choosing, and cooking good food and for landscape sustainability, diversity, and resilience. We suggest three main characteristics of gastronomic landscapes that encompass their essence: Locality, Diversity, and Quality. These characteristics are described in Fig. 1 and Box 1 and will be further detailed in the discussion.

We also suggest three different types of gastronomic landscapes exemplified through the cases in section 2, ranging from those intentionally managed primarily for food production (Gastronomic Farmscapes) to wild or more passively managed natural areas where hunting and gathering occur (Gastronomic Foragingscapes), with Gastronomic Restorationscapes in between these, where gastronomy and ecosystem restoration enable each other (Fig. 2).

In defining these landscapes, we have built on the idea of Foodscapes (Mikkelsen, 2011; Vonthron et al., 2020). Foodscapes in essence connect the food system between food consumption and production by the use of systems perspective. It requires cross-scale approaches, as it connects the actual place where food is found (Friedberg in Mikkelsen, 2011) in distinct food production geographies, including biophysical aspects and management practices (Bossio et al., 2021), to the consumer who eats the food. These can be distant and different places. For example, an urban foodscape links the urban consumer to the rural agricultural fields that generate that food. The concept of gastronomic landscapes considers this previous work on foodscapes, but emphasizes the potential of linking landscape management to food for culinary developments, locally, or more distant. There have been some previous attempts to link gastronomy and foodscapes (e.g., Richards, 2015; Fusté-Forné, 2018; Alden; 2021). Alden (2021) suggested that foodscapes can be used to highlight the role of gastronomy for changes toward resilience, equity, and sustainability, while Fusté-Forné (2018) suggested how a gastronomy landscape could be revealed by looking at foods available in local markets. Others have looked at how culinary food products from different landscapes can help preserve a place's environmental and cultural identity, promote sustainable agricultural landscapes, re-connect humans and nature, and enable landscape preservation and restoration (García-Martín et al., 2022; Quaranta and Salvia, 2011).

The six cases presented here were selected to represent both dominant and marginalized knowledge systems, and showcase the diversity found within each type of proposed gastronomic land/seascape. We include cases where food is produced and consumed locally, to where it is produced locally but consumed globally. The cases represent landscapes with varying degrees of human land use conversion, that is, the scale of human made changes to landscapes including for example, built infrastructure and the development of agricultural land (Rist et al., 2014; Newbold et al., 2015) (Fig. 3). Overall, the cases span four continents and represent a variety of ecologies and culinary actors. One author has previously worked with each case to varying degrees, and they offer illustrative examples useful for exploring different gastronomic landscapes, but are in no way meant to be definitive. Appendix A provides an overview of the case studies and describes the author's connection with each case, what type of data was collected, and offers evidence and key references as to how the cases contribute to food system sustainability. In reality, most cases could encompass several different gastronomic landscapes, but often, one specific landscape type is more prominent. Each case study illustrates how stewardship capacities of care, knowledge, and agency (Peçanha Enqvist et al., 2018) manifest in that place.




**Fig. 1.** The three key characteristics; locality, diversity, and quality encompassing a gastronomic landscape. The different fonts indicate the following: Normal: Improves biosphere stewardships, **Bold:** Contributes to sustainability, and *Italics:* Enhances culinary developments and gastronomy.

**Box 1**
The three key characteristics; locality, diversity, and quality encompassing a gastronomic landscape explained in further detail.

**Locality**, includes relationship to place, meaning that it is rather the relationship to a specific place that is essential, not the geographical distance between production and consumption (i.e. not only about locally produced and consumed food). Locality includes the competencies, care, skills, culture, local and traditional ecological knowledge needed to produce, prepare, choose, and eat food. As exemplified in the concept of terroir, where the uniqueness of what specific places offers is in focus.

**Diversity**, is a prerequisite for food production resilience, where agrobiodiversity is essential and can also provide increased dietary diversity of nutrition and sensory experiences. Agrobiodiversity that has co-evolved with culture, specific practices, and knowledge, known as biocultural diversity, is integral to gastronomic landscapes. A diversity of knowledges exists across gastronomic landscapes, where the knowledge of farmers, fishers, chefs, cooks, consumers, and indigenous people are essential for fostering biosphere stewardship.

**Quality**, focus on multiple values rather than quantity. Sensory qualities of meals (including aroma, appearance, taste, texture) and culturally appropriate foods. Nutritional quality relates to healthy and nutritious diets, including crops, wild species, and other food sources of high nutritional quality. Environmental quality refers to how producing, choosing, preparing, and eating can influence biosphere stewardship and enhance resilience and environmental sustainability.

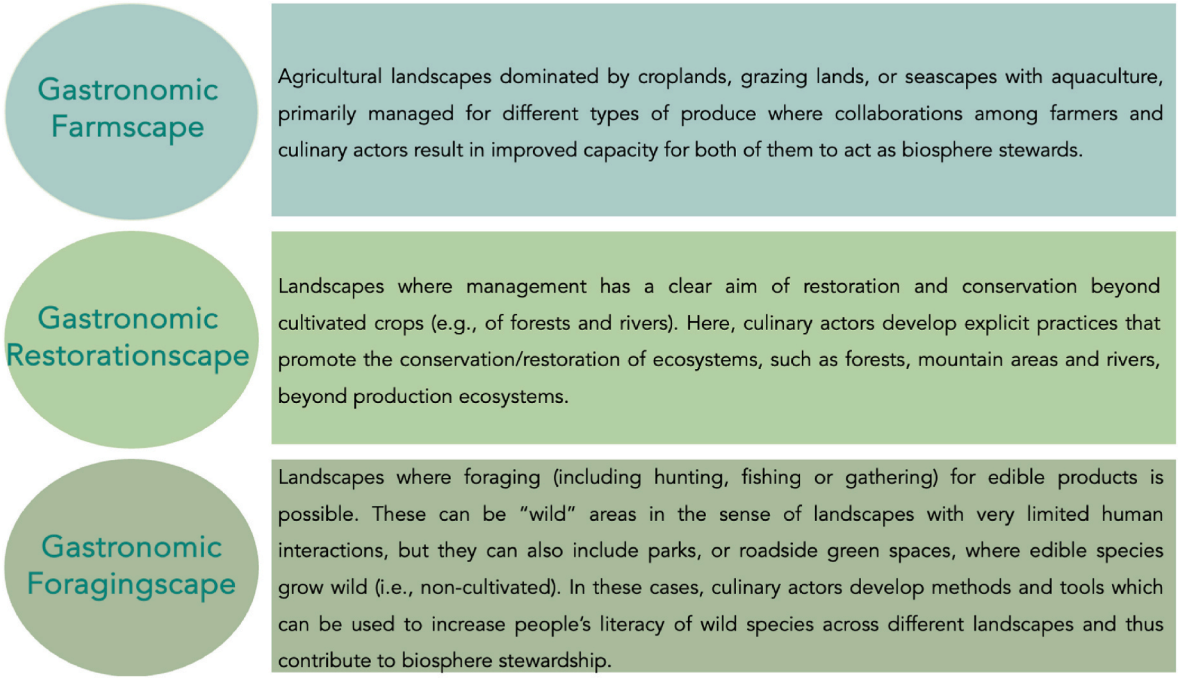



**Fig. 2.** The three suggested types of gastronomic landscapes; Gastronomic - farmscapes, Restorationscapes, and Foragingscapes.

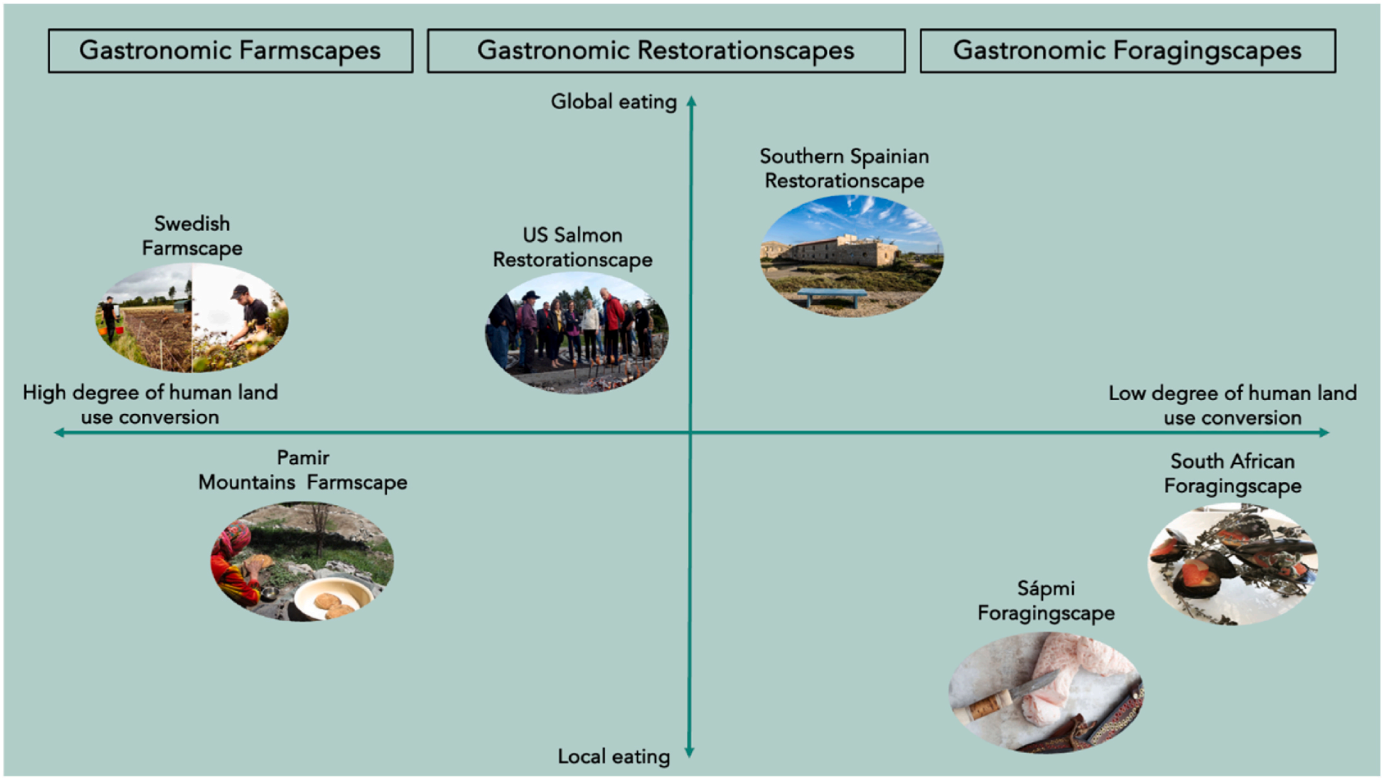



**Fig. 3.** The six cases are displayed in a cross-gradient, going from high to low degree of human land use conversion on the x-axis and from global to local eating on the y-axis. The three main types of gastronomic landscapes are shown at the top and indicate which of the cases fall into each type of gastronomic landscape. [1] Photo credit: Southern Spainian Restorationscape: Apoinente, US salmon Restorationscape: Jessica Kershaw, US department of the interior, (June 4, 2016), Sápmi Foragingscape: ©Slow Food Sápmi/Bianca Brandon-Cox.

### *2.1. Gastronomic Farmscapes*

#### *2.1.1. Developing and maintaining a gastronomic farmscape in the pamir mountains of Afghanistan*

The bounty of what gastronomic landscapes can produce partly lie in the eye of the beholder. Some landscapes may naturally encompass plentiful diversity and abundant production. In other landscapes, humans have had to work over millennia to create life-giving soils. The Pamir Mountains, where agriculture occurs between 2000 and 4000 m above sea level, is one such place. Through human ingenuity and learning, rocks were moved, soils were irrigated, and robust wild crop varieties were domesticated. The Pamir Mountains are a 'center of origin (of diversity)' as defined by the renowned botanist Nikolay Vavilov. A center of origin is where organisms first developed their distinctive properties and were domesticated (FAO, 2011). For example, various grains were first domesticated in the Pamirs, and today it harbors incredible agricultural diversity with over 150 varieties of wheat, each selected and retained for its distinct qualities in unique micro-climatic growing conditions (Haider et al., 2019).

The agricultural biodiversity has coevolved with cultural practices, rituals, and knowledge that collectively can be seen as biocultural diversity (Maffi, 2005; Giuliani et al., 2011; Haider et al., 2021). Farmers and chefs collaborate to decide each year which seeds to sow and save. Based not just on their productivity and viability in poor soils, but also on different quality aspects, such as taste, nutrition, and their interactions with other plants. Some crops become so important that they gain spiritual significance, and ceremonies centered around cooking special dishes are held to ensure good harvests, health, and vitality for all. For example, a special porridge using very sweet red wheat is prepared to celebrate the coming of Spring. Other dishes are made as offerings to gods or to celebrate the returning shepherd from summer pastures (see van Oudenhoven and Haider 2015 for more recipes and stories). Through these stories, one sees how gastronomic practices (choosing, cooking, and eating) of the Pamiri People not only safeguard biodiversity that maintains the landscape but also create and maintain traditional ecological knowledge, certain value systems, and beliefs (Haider and van Oudenhoven 2018).

While these examples are localized, a small project beginning with a promise to a grandmother in the Pamir Valley of Gund to write down her recipes turned into a book (van Oudenhoven and Haider, 2015) and has spread the knowledge outside the region. The book won the 'World's Best Cookbook Award 2016', and brought the gastronomy of the Pamir Mountains to a world stage. Chefs around the world were intrigued by the cooking techniques used in the Pamirs, such as the joint sowing, harvesting, and milling of pulses and grains to make '*hazorza*', which means 'flour of a thousand grains', used to make the earthy noodle soup, *Osh*. This example shows how local practices can lead to cross-scale knowledge exchange and deep scaling of practices.

#### *2.1.2. Developing a gastronomic farmscape on a Swedish lamb farm*

In the fall of 2017, a farmer and a top chef from a restaurant in the Swedish countryside hosted their first pop-up restaurant in the middle of a flowering buckwheat field. The idea was to create a unique experience based on simplicity. A dinner entirely based on ingredients available in season from the farm, a temporary kitchen, and conversations between guests and organizers. The restaurant's foundation was the farmers' and chefs' love for the biosphere shown through food. As the farmer put it:

> "When we farm the land, take care of our animals and environment, we do it with great respect. … We regard ourselves as biosphere stewards. Out of this comes fantastic ingredients. … No big words are needed. The earth, the animals, the raw materials, and the food speak for us."

The temporary restaurant was just one way in which the farmer since 2015 has been turning his organic lamb farm into a gastronomic farmscape that he defines as the 'sustainable farm of the future', with a clear

framing of the farmers as potential biosphere stewards. In 2015, the 67 ha of land held 100 sheep giving birth to approximately 250 lambs each year. Most meat was sold to a large meat-producing company, with only a small share of sales directly to customers. In 2019, the farm produced a wider range of crops and meats and has cultivated a range of new relations with customers who buy produce, most of it with high culinary and sustainability qualities. For example, the farmer found an old oat variety, no longer cultivated for sale. He contacted an oat processing company and started a collaboration, where they jointly produced and marketed "Old Fashion Oat drink" based on the oat landrace. Similarly, he has collaborated with one of Sweden's largest retailers producing a Swedish falafel based on a Swedish pea variety. The pea is not usually cultivated for human consumption but its particular sensory and nutritional qualities make it a great basis for falafel-like products. He also produces cabbage for a local kimchi factory and rye for a local artisanal sourdough bakery and sells produce to restaurants locally and in Stockholm. These examples show how cultivated agricultural biodiversity can be preserved and restored in ways that promote landscape stewardship, and that the unique sensory, nutritional, and cultivating qualities of different species can be used in various gastronomic products.

The now substantially diversified farm has a lower climate impact, feeds more people overall, has almost doubled its annual turnover, and has proven to cope fairly well with a nationwide drought in 2018 and a pest outbreak in 2019. The empirical evidence of the farmer's impact on sustainability and resilience is documented in Röös et al. (2021). Focusing on combining culinary developments with biosphere stewardship has been fundamental for the farmer during the transition to a gastronomic farmland.

### 2.2. Gastronomic Restorationscapes

#### 2.2.1. Restoration of landscape for salmon as sustenance and spirit in the western US

In the western US, river restoration efforts are overwhelmingly motivated by salmon recovery (Bernhardt et al., 2005). The implicit motivation for many people is species conservation, such as taxonomic protection under the federally implemented US Endangered Species Act. However, for the people in regions where salmon returns naturally, salmon are life, and salmon recovery is an act of restoring their gastronomy, well-being, society, and a step towards regaining food sovereignty (Coté, 2016). The change in motivation from conservation to food is important. It brings in environmental stewardship from distant philosophical and often contentious debate to a shared cultural love of food, including hunting, preparing, and eating around the hearth.

In the Klamath River Basin (USA), for example, conflicts are decades-long and continue over water for agriculture and cattle versus salmon and indigenous ways of life (Levy, 2003). The conflict is cultural and partly over food choice - beef and potatoes versus fish. The problem emerges from two distinct landscapes being intricately connected through water. A step towards a solution is building a shared appreciation of place, culture, and food. Although still contentious, a series of four dams are being removed on the Klamath, as this article is being written (Cornwall, 2023). Evidence suggests that this appreciation plays a role in improving communication among actors when seeking equitable solutions (Chaffin et al., 2014), although more effort is needed to assure equitable outcomes.

The desire for wild salmon, both to eat and to observe, has landscape implications and are linked through gastronomy. Understanding of traditional foods and food harvesting practices is being revived and brought to the table through knowledge and numerous cookbooks (Nabhan 2006; Turner and Turner 2007). Certification programs help restaurants and food providers use science-based information to improve biosphere stewardship (e.g., Monterey Bay Aquarium Seafood Watch Program). These programs reach beyond river restoration, and onto the farm field. Regional breweries and suppliers source their grains from certified Organic and Salmon-Safe producers (Scribner and Omoto, 2018). The motivation is not solely biological conservation, but grain taste and clean water for beer. The term "Brewshed®" exemplifies the link between beer and place (Oregon Brewshed Alliance, 2024). The Alliance includes both breweries and grain supplies, such as Mainstem Malt who purchases and roasts unique dry-farmed malting grains sourced from specific years and places. Not unlike the French *terroir* concept which emphasizes the environment's influence on wine grapes sensory properties (Aurier et al., 2005). The knowledge and care put into the product are communicated to the consumer about the regional and biosphere implications of daily decisions through the craft and art of brewing quality beer; however, it is too early to assess the true environmental and social impacts of conservation-oriented beer making (Ness, 2018). Emergence of these coordinated actors suggests, however, that gastronomy can fuel landscape restoration by linking environmental quality to sensory quality, through an iconic species.

#### 2.2.2. Restaurant aponiente is serving award-winning seafood and restoration projects in southern Spain

Found in an old tidal mill in El Puerto de Santa María, Cádiz, is the award-winning seafood restaurant Aponiente. It has been rewarded for its high-quality gastronomy and sustainability work with, for example, the first ever Green star and three stars from the Michelin Guide (Michelin, 2024). It is led by Ángel León, often called *Chef del Mare*, chef of the sea. The restaurant has since its opening focused on what the local area, including the sea, can offer, such as discarded fish, less valued species, and phytoplankton, by combining traditional knowledge and innovation to create vanguard cuisine dishes (Guerrero, 2018; Guerrero et al., 2019). Vanguard cuisine can be seen as a part of the Spanish culinary revolution and puts equal value to all ingredients on the plate, includes surprises, puts an emphasis on texture and temperatures, and highlights the importance of the produce and its flavors (Tortosa, 2012; Guerrero et al., 2019). Aponiente honors the traditional culture of Cádiz by using a myriad of local ingredients in a bricolage of innovation, gastronomy, and traditional ecological knowledge including how to locate, preserve, and cook native species (Guerrero, 2018). One way is by re-thinking traditional Spanish charcuterie using otherwise underutilized or discarded fish, algae, and phytoplankton, which can alleviate pressure on ecosystems or overfished marine species and improve food security (Gephart et al., 2021; Wessels et al., 2023). Seafood is embedded in the local culture making the fish- and algae-based charcuterie part of the cultural and traditional taste and cooking repertoire. The gastronomic and local knowledge taken into the kitchen contributes to the guest's acceptance of the innovative dishes and promotes eating a richer diversity of produce with different qualities.

The restaurant is also working outside the tidal mill. Together with scientists, fishermen, and villagers, they promote restoration work of the marshes and coastlines and the preservation of local biodiversity. The work has resulted in a 70 acres large maritime-terrestrial recovery in the Natural Park Bahía de Cádiz, home to over 300 species (Chef's Secret, 2019). The work to restore and preserve the salt marshes has also been successful, where the protection of local biodiversity, essential for ecosystem resilience and the local society, culture, and economy has been agreed upon (Chef's Secret, 2019). Additionally, León has initiated a project to start cooking and cultivating the native seagrasses *Zostera marina* (Kassam, 2021). The seagrass is described as an ecosystem engineer, forming meadows that are some of the ocean's most biodiversity-rich systems (Sánchez and Cuellar, 2016). Apoinente uses this seagrass to produce traditional dishes usually based on flour. The same craft used for producing flour, from harvest, drying, milling, and cooking are used, but with a new ingredient. In summary, Aponiente focuses on promoting biodiversity, traditional ecological knowledge, and culture through new innovative gastronomic experiences.

### 2.3. Gastronomic foragingscapes

#### 2.3.1. Foraging in Western Cape, South Africa helps see the landscape

In the Western Cape of South Africa, a movement to reconnect with the landscape through wild edibles has begun (Pereira et al., 2019). Wolfgat, a small restaurant just north of Cape Town in Paternoster, won the Restaurant of the Year award at the inaugural World Restaurant Awards in 2019. Kobus van der Merwe, the chef and owner, has built up his restaurant around showcasing what the West Coast of South Africa has to offer: '*What I wanted to present at the eatery was something that's truly local and represents the landscape … The moment you start noticing what's growing around here, and what's edible, it's amazing* (Kobus, in Lindow et al., 2017, p.17)". At Wolfgat, the indigenous but underutilized crop sorghum has also been promoted. Its potential is showcased through gastronomic experiences. At the same time, these dishes speak to sorghum's deep cultural importance by serving it as familiar porridge with ice cream from traditional beer that tells the story of how it is traditionally prepared and eaten (Pereira, 2021). Here sorghum "*is at the same time gastronomy as well as being a cultural artifact* (Pereira, 2021, p.138)".

Kobus also works closely with Loubie Rusch, founder of Making Kos and Local Wild and a self-proclaimed 'wild food innovator'. Rusch has been experimenting with processing and eating indigenous plants of the Western Cape and has started cultivating some of the more promising fynbos species with specific qualities. The Western Cape is home to the threatened and biodiversity-rich Cape Floral plant kingdom and boasts hundreds of edible plants (Myers, 1990; Turpie et al., 2003). Considering the protected nature of many wild plants, foraging is not a long-term sustainable strategy, so cultivating some of these plants as slangbessie (*Lycium ferocissimum*) is an important complement to the strategy of wild eating (Pereira et al., 2022). Rusch is also involved in teaching others to appreciate the indigenous landscape and its potential as a food source by hosting workshops with interested people, working in collaboration with community garden initiatives, and consulting chefs through her new start-up Local Wild: "*Rusch notes that foraging in the landscape is often a first step towards people seeing food in the landscape, a view which then opens new possibilities for thinking about indigenous food production as a climate resilient strategy* (Lindow, 2017, p. 141)."

The case of foraging influenced by the pioneering chefs in the Western Cape shows the existing opportunity to stimulate an interest in biosphere stewardship through a culinary interest in food. Through foraging, knowledge grows of the landscapes in which diverse species are found. It stimulates care for the landscapes and can give people agency to act in new ways whilst also being cognizant of the historical legacy of colonialism in this region that not only eroded the food system, but marginalized the knowledge of local and indigenous peoples (Pereira et al., 2022). This caveat is imperative as much knowledge can also be captured just for the benefit of elites. Through foraging, people can learn to appreciate various landscapes' gastronomic and ecological values, whilst mindfully resuscitating and acknowledging the knowledge systems embedded within such landscapes.

#### 2.3.2. Tacit knowledge, craftsmanship, and foraging as central parts in sámi gastronomy

The vast landscape of Sápmi stretches across the northern parts and borders of Norway, Sweden, Finland, and the Kola Peninsula in Russia. It holds a wide variety of biotopes and biodiversity. Sápmi is home to the indigenous people of Europe, the Sámi. For thousands of years, Sámi people have lived with and from the land in a nomadic to semi-nomadic lifestyle centered primarily around reindeer husbandry and foraging (Sara, 2009; Mellegård, 2015; Lanyon 2021). The nomadic lifestyle has influenced the food culture in several ways, from choosing what to forage, to cooking and preservation techniques which have resulted in distinct flavors (Harnesk, 2014; Lanyon 2021). The craftsmanship of Sámi cooking is embedded in the local nature, people, and culture (Lanyon et al. 2024). The traditional ecological knowledge of food craftsmanship has been passed down as tacit knowledge through generations through practice and doing. A cookbook has been co-created by the Slow Food Movement Sápmi, chefs, local people, and reindeer herders to spread awareness of this knowledge and share it using pictures, stories, and recipes (Harnesk, 2014).

Served on a plate made from birch wood lies a thinly sliced reindeer tongue carpaccio seasoned with birch oil and meadowsweet (*Filipendula ulmaria* L), topped with cloudberries, foraged edible leaves, and croutons of reindeer blood-bread. The dish is one of many recipes in the cookbook on Sámi gastronomy (Harnesk, 2014). The book serves to communicate the knowledge and worldviews of the Sámi community and aims to inspire people to cook with care and respect towards ingredients and the landscape. It is an educational cookbook where the reader, through different recipes, learns about Sámi food culture, is inspired to use new ingredients, learns where to find them, how to use them in cooking, and how to take care of and cook with different reindeer meat cuts. Thereby increasing the readers' literacy of wild foods (Rosas et al., 2022).

Reindeers have been a central part of Sámi culture for thousands of years, and reindeer husbandry provides resources for food, tools, livelihoods, and clothing (Harnesk, 2014; Mellegård and Boonstra, 2020). Handicrafts and food crafts are both important aspects of Sámi culture, characterized by a resource efficiency that honors the local land, rivers, and seas and what they provide (Lanyon et al. 2021). The knowledge of what ingredients the land and different seasons provide is incorporated into the making of handicrafts and food products (Mellegård, 2015; Harnesk, 2014). Craftsmanship can be seen as the link between the person practicing their knowledge and the social and ecological system they are embedded in (Mellegård, 2015; Mellegård and Boonstra, 2020). Craftsmanship is central in Sámi cooking; making handicrafts and food products is part of one process, where post-slaughter, the whole reindeer is taken care of and used for cooking, clothing, and handicrafts. Caring for the landscape, the animals, and the diversity of plants in it, is incorporated into the cookbook. As such, Sámi gastronomy can be seen as a tool that can contribute to stewardship of landscapes informed by indigenous traditional ecological knowledge held by the Sámi people (Lanyon et al. 2024).

## 3. Gastronomic landscapes for biosphere stewardship

The cases show that gastronomic landscapes can exist in various ways in which culinary interests and landscape management can interact to generate high-quality produce and build enhanced capacity for stewardship of these landscapes. They also show how the stewardship capacities of care, knowledge, and agency (Peçanha Enqvist et al., 2018) can reside in landscapes and how they are enabled and reinforced by different actors, within and external to the physical production landscape. Throughout the different cases, it is also clear how the three key characteristics, Locality, Diversity, and Quality, manifest. We structure the following discussion around these three characteristics of gastronomic landscapes and illustrate how the concept of gastronomic landscapes can contribute to future studies on food practices and sustainability by considering the relationship among locality, diversity, and quality, and how they can give rise to sustainability. The characteristics can also be used as a structure or frame for capturing wide aspects of gastronomy and food, needed to continuously develop the fields of food studies and new gastronomy (Blackley and Reid, 2022).

### 3.1. Locality

Locality reconnects to the place and builds off what that land can generate sustainably over time. This does not only mean that food needs to be locally consumed; rather, it is about appreciating the quality of the local, even as food is consumed elsewhere. The concept of terroir in the wine industry is similar (Wilson, 1998). The unique soils, micro-climates, and topography lend specific characteristics to grapes

that add culinary and monetary value to the wine-making process (Wilson, 1998; Leedon et al., 2021). The concept of terroir also in agricultural production and products is expanding (Aurier et al., 2005; Paxson, 2010). Terroir has been suggested to function as a story-telling practice (Castello, 2021; Charters et al., 2017), by which the care and knowledge of the local place of production and processing can be communicated to local or distant consumers through sensory experiences and the stories told by chefs or cooks, creating relationships between places and consumers. As in the Brewshed case, the consumer and producer are invited to share and increase their knowledge, the producer enhances their agency to take actions that favor resilient and sustainable production, while the consumers are provided increased agency in actively and knowingly choosing foods that contribute to restoration and care of the landscape.

The branding of Protected designation of origin (PDO) is a similar way of recognizing how food is produced, processed, and prepared in a given geographical area (Reinders et al., 2019). Both terroir and PDO help people reconnect to specific places and the unique qualities that food produced in that landscape offer. In that way, PDO and terroir echoes McMichael's (2009) 'Food from Somewhere' as a counterpoint to 'Food from Nowhere'. 'Food from Somewhere' is characterized as having closer ecological feedbacks, allowing for more positive adaptive responses than the invisibility, and problems with cultural legitimacy, with 'Food from Nowhere' (Campbell, 2009; McMichael, 2009). Locality enables a contextual environment and values food as a human-environment relationship rather than a global commodity (Pereira et al., 2020b). The reconfiguration of relationships to the locality also lies at the heart of alternative food movements such as the Slow Food movement. The Slow Food Supply Chains is a major institutional expression of reconfigured production-consumption relations (Marsden et al., 2000: 425 in Goodman: 10).

The importance of locality is evident across all the case studies, such as how foraging from local landscapes in the Western Cape of South Africa creates relationships to place or how the harvesting of marine products in the sea shores close to Aponiente evokes a sense of place associated with unique quality products. In the Sámi case, the long-term relationships to landscapes and their nature are at the core of culture. The different approaches of reconnecting, re-localizing, and revitalizing production and eating in terroir, PDO, 'Food from Somewhere', and the Slow Food Movement are manifested in the locality as part of gastronomic landscapes.

### 3.2. Diversity

In the context of deep uncertainty with a changing climate, it is unclear which portfolio of crops and seeds will be able to grow in rapidly changing landscape conditions around Earth. Drought- and pest-resistant strains will likely become increasingly important over time. The global food system has been moving in the other direction, becoming increasingly homogenized over time (Khoury et al., 2014), and most subsidies have gone into growing a few species more efficiently (primarily rice, maize, wheat, and soy). In the future, we must increase the cultivation of high-quality grains, legumes, nuts, fruits, and vegetables, recognized as major contributors to healthier diets (Willett et al., 2019). This will be as important in nutrient-poor contexts, such as the Pamirs, as it will be globally and regionally when shifting towards more plant-based diets. Active stewardship of gastronomic landscapes can play an important role in enhancing the diversity of responses to shocks and for healthier diets.

Global initiatives such as the Svalbard seedbank are saving genetic diversity of seeds to safeguard future food security, but the more tacit knowledge and practice that co-developed these seeds over millennia are seldomly saved with those seeds (Haider, 2021). Biocultural diversity is broadly acknowledged as a foundation for social-ecological resilience, contributing to food security and underpin many food sovereignty movements (Merçon et al., 2019; Poole, 2018; Hanspach et al., 2020). The importance of biocultural diversity in gastronomic landscapes can be seen from a functional and a more constructed or embodied perspective. The biodiversity that coevolved over centuries or millennia with human cultural practices is often most evident in human-dominated, and especially gastronomic landscapes. The diversity of foods we cherish today, for both their nutritional and sensory qualities, did not appear by accident, but are the result of millennia of careful experience-based selection and retention by people worldwide, often in the most unlikely of landscapes like the foothills of the Pamirs, the sub-Arctic zone of northern Europe or the semi-arid coast of south-west Africa.

Rituals and daily practices are living repositories of this knowledge that matter not just for in-situ conservation and place-based adaptation, but for global food system resilience and food security. The Swedish sheep farm case where landraces of oats and peas are farmed is one example of how agricultural biodiversity is preserved in-situ and how tacit knowledge about older varieties is revitalized when used for new products. The sheep farm also illustrates the resilience provided by agricultural diversity to withstand shocks such as droughts and pest outbreaks. Another example is the daily practices of farmers in the Pamir Mountains that domesticated grains, fruits, and nuts that are staples in our diets today (van Oudenhoven and Haider, 2015). At the same time, chefs in many top restaurants procure otherwise underutilized products. For example, they experiment with new combinations of textures, flavors, and aromas in their search for the highest quality of ingredients and support genetic diversity of plants and animals, as seen in the Aponiente and Wolfgat cases. The chefs connect cities with landscapes by carefully selecting their produce, thereby enhancing competencies and practices that generate such produce, and promote their values in society. These are examples of culinary craftsmanship of cooks and chefs, which we refer to as stewards of gastronomic landscapes.

### 3.3. Quality

Volume and quantity of production are insufficient to solve the global food systems challenges we face (Gordon et al., 2017). Through the case studies, it becomes clear that thinking and acting in line with gastronomic landscapes supports measures, interventions, or approaches that reduce environmental pressures and contribute to stewardship of landscapes in ways that create improved quality across multiple values. As in the case of salmon, where the changed focus from conservation to food and gastronomy helps fuel landscape restoration by linking environmental quality and sensory quality.

Quality might seem subjective as it can be defined in many ways and can mean different things to different actors at different times. Ilbery and Kneafsey (2000) highlight a difference between what counts as quality, where on the one hand, there is quality through standardization in industrial food production with low price as an outcome vs. the alternative food production systems where artisanal, health, and environmental aspects are highlighted as quality. Quality is a complex notion with varying meanings across products, people, and regions (Ilbery and Kneafsey, 2000; Bowbrick, 2014) where its meaning derives from interactions among actors (Marsden and Arce, 1995). While acknowledging the inherent complexity in determining good or high quality within food systems, it can be fruitful to focus on understanding quality as the social-ecological relationships that underpin care in biosphere stewardship (West et al., 2018). Understanding quality as such, follows Goodmans' (2003) line of thought when synthesizing prior work on the "quality turn" in agri-food systems, where he argues that quality needs to be understood as something relational that is produced in reciprocal exchanges between people and nature, embedded in trust, tradition, and place.

A specific example from the Pamir Mountain case is where wheat has been cultivated and selected for specific quality traits that relate more to taste, nutrition, and ecology than productivity. The decision on which seeds to keep is also taken together by farmers and cooks with the

landscape in mind. The breadth of quality is further exemplified across the cases presented, where nutrition, ecosystem health, cultivation, flavors and textures, and culture are evident qualities of gastronomic landscapes. Suggesting that, by showing care in and beyond relationships between actors and landscapes, it can be easier to find common ground for what is regarded as high or good quality.

## 4. Conclusions

Current trajectories of food systems have led to multiple social and ecological challenges and increasing vulnerabilities to different shocks (Nyström et al., 2019). A central challenge is the physical and emotional disconnect between food production and consumption. Such challenges reinforce the need for food system transformations. This paper presents the concept of gastronomic landscapes as one of several ways forward. Gastronomic landscapes are managed, governed, or nurtured to contribute specifically to culinary development while supporting landscape resilience and sustainability. Gastronomic landscapes, characterized by locality, diversity, and quality, are developed from the practice, art, skills, and competencies needed for producing, selecting, and cooking good food. Gastronomic landscapes build on the stewardship capacities of care, knowledge, and agency needed for managing land/-seascapes as part of a resilient biosphere. The case studies presented show how this stewardship manifests across different regions, landscapes, and cuisines and that it is ongoing.

Further research is needed to better incorporate diverse knowledge systems and on how to protect the rights of indigenous knowledge holders in the context of gastronomic sea/landscapes (Pereira et al., 2022). Even if the concept does not yet offer a quantitative approach to evaluate or measure transformative potential, resilience, or sustainability it can still be used to capture wider aspects of gastronomy needed to develop the fields of food studies and new gastronomy. Gastronomic landscapes offer a hopeful conceptualization for exploring food systems from different angles that can help identify and highlight positive narratives and initiatives needed for change or transformations. By explicitly connecting gastronomy and biosphere stewardship, we believe that the concept of gastronomic landscapes will stimulate thinking and action to help build social-ecological resilience and food sovereignty.

## CRediT authorship contribution statement

**Amanda Jonsson:** Writing – review & editing, Writing – original draft, Visualization, Project administration, Data curation. **L. Jamila Haider:** Writing – review & editing, Writing – original draft, Data curation, Conceptualization. **Laura Pereira:** Writing – review & editing, Writing – original draft, Data curation, Conceptualization. **Alexander Fremier:** Writing – review & editing, Writing – original draft, Data curation, Conceptualization. **Carl Folke:** Writing – review & editing, Writing – original draft, Conceptualization. **Maria Tengö:** Writing – review & editing, Writing – original draft, Data curation, Conceptualization. **Line J. Gordon:** Writing – review & editing, Writing – original draft, Supervision, Project administration, Data curation, Conceptualization.

## Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

## Data availability

The articles builds on published case studies available through open access and detailed in Appendix A.

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## Appendix A. Description of cases

The six cases are listed in order of appearance in the article. The author who has worked with each case and to what extent is indicated, as well as key references, data types collected, and the link to food system sustainability.

| Case Study | Author with primary research experience in case | Key References | Data type collected | Evidence for food systems sustainability |
|---|---|---|---|---|
| Pamir Mountains Farmscape | Jamila Haider was the primary researcher for a long-term biocultural study in the region and co-authored "With Our Own Hands: A celebration of food and life in the Pamir Mountains of Afghanistan and Tajikistan." | Van Oudenhoven and Haider (2015); Haider and van Oudenhoven (2018); Haider et al., 2019 | Ethnographic data; recipe collection; ethnobotanical data. | Biocultural diversity is supported through gastronomic practices that can enhance food security (Giuliani et al., 2011; Haider and van Oudenhoven 2018) and in other contexts: Barthel et al., 2005; Argumedo et al. (2021); Turner et al., 2019. |
| Swedish Farmscape | Line Gordon, was part of a research team that did a sustainability and resilience assessment of the farm. | Röös et al., 2021 | Yield and production data; economic data; LCA (Life Cycle Assessment) data; semi-structured interview with farmer. | Data showed that more people could be fed, with lower climate impact, and increased resilience in terms of food security, economy and farmer identity after the change in management of the farm (Röös et al., 2021). |
| US Salmon Restorationscape | Alexander Fremier researches the effectiveness of river restoration on foodwebs that support Pacific Salmon. His research on salmon is predominately | Bellmore et al., 2014; Mejia et al., 2016, 2019 | Collaborative research with Yakima Nation on the ecological outcomes of stream restoration. | Landscape restoration has been fueled by linking environmental quality to sensory quality. The importance of salmon for identity and food culture, and how restoration efforts lead by indigenous |

(*continued on next page*)

(*continued*)

| Case Study | Author with primary research experience in case | Key References | Data type collected | Evidence for food systems sustainability |
|---|---|---|---|---|
| | coordinated with indigenous nations in the US. | | | people have put focus on relationship to place and food sovereignty (Coté, 2016). |
| Southern Spain Restorationscape | Laura Pereira was the primary supervisor of Lara Guerrero's master thesis and collaborated on the resulting publication on social-ecological innovations and Traditional Ecological Knowledge (TEK) for more sustainable agri-food systems in Spain. | Guerrero Lara, 2018; Guerrero Lara et al. (2019) | Interview data. | The importance of revitalizing TEK of food to counter industrialist paradigms and achieve sustainability and how the interplay of TEK and gastronomic knowledge is essential for shorter food value chains and consumer agency (Guerrero Lara et al., 2019). |
| South Africa Foragingscape | Laura Pereira has been part of and leading research projects on food systems and sustainability in South Africa. | Pereira et al. (2019), 2021 | Interview data, participatory workshops. | Leveraging local biodiversity can achieve sustainability, but needs to address colonial legacies, equity, and the recogtwo ochnition of diverse knowledge systems and holders of indigenous knowledge for a more holistic sustainability (Pereira et al., 2019, 2021). |
| Sápmi Foragingscape | Maria Tengö has supervised master theses in collaboration with Sámi scholars. | Mellegård (2015); Mellegård and Boonstra (2020); Lanyon-Garrido (2021); Lanyon-Garrido et al. (2024) | Interview data, photo elicitation, biocultural mapping, knowledge co-production. | Evidence for deep knowledge, governance systems, and relationships, connected with land stewardship and quality of produce (Mellegård and Boonstra, 2020; Lanyon-Garrido et al., 2024). |

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