CHAPTER 9

THE TEEBAGRIFOOD THEORY OF CHANGE: FROM INFORMATION TO ACTION

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SUMMARY

Chapter 9 shows how adopting the TEEBAgriFood Evaluation Framework can bridge the gap between knowledge and action. Factors that block the absorption of externalities in food systems, including path dependency and counter-narratives regarding healthy diets, lead us to derive lessons for transformational change reflecting the critical role of power relations. Experience in agri-food certification and multi-stakeholder roundtables bespeak the need to address change from the starting point of key actors and relevant groups, including farmers, government, industry and consumers. Successful change in food systems to reflect invisible values can be enabled by identifying specific action roles through partnerships and alliances as well as multilateral agreements including the SDGs.

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9.0 KEY MESSAGES

- Information alone often fails to motivate change. Manipulation of data has led consumers to doubt scientific results, serving special interests at the expense of public benefit. Information overload implies the need for synthesis to enable better access and impact.
- Rationalizations against the need for change include: fatalism, arguing that business is already changing of its own accord, that cheap food is more important than good food, and that the marketplace will adjust for externalities.
- These views do not address the long-term systemic consequences of the global corporate model of food systems in a society that derives calories from corn syrup and protein from hamburger resulting in obesity and disease.
- Free market, neoliberal policies are incapable of resolving externalities that affect public goods such as ecosystem services. Faith in the infallibility of the market is a shortcoming of mainstream economics.
- Path dependency is a key barrier to change in food systems, causing inertia, but may also lock-in positive systemic change. A science of intentional systemic change is arising, grounded in better understanding of human economic behavior as the basis for collective action.
- We espouse not one theory but rather a range of actor-relevant theories of change.
- Consumer advocacy can bring businesses to assume greater responsibility for the effects of their actions. This theory of change has found expression in the threat of boycotts and reputational risk.
- Certification has led to improvement in production practice within market niches but its true success begins when it pressures change in policy and practice throughout supply chains.
- Governance of intentional transformation in food systems requires knowledge of political pressure points, and systematic efforts to shape narratives of principal actors, to redirect financial resources and to promote institutional and societal learning and adaptation.
- We address the potential of multilateral organizations and agreements, national governments, the financial industry, agribusiness, producers and consumer groups to respond to the need for change. The roles of different actors are interlocking: there is no single point of entry for a theory of change.
- The roles of principal actors are drawn along a continuum of change, suggesting specific roles and types of actions to be addressed in evaluation and intervention. Given societal concern, agents for change may persevere within government, agribusiness or civil society organizations; their ability to bring change is dynamic and opportunistic, and driven by strategic alliances. As levers of agrifood system transformation, it is crucial to engage influential governmental actors as change agents.
- Actors' respective ability to adopt the results of TEEBAgriFood studies as a tool to direct change will depend on how well those results are communicated and adopted as narratives by influential actors and as entry points for education and consumer consciousness.

CHAPTER 9

THE TEEBAGRIFOOD THEORY OF CHANGE: FROM INFORMATION TO ACTION

9.1 INTRODUCTION – DEFINING A THEORY OF CHANGE WITH RESPECT TO TEEBAGRIFOOD

This chapter shows how better knowledge on invisible costs provided to key actors in food systems can be used to influence decisions to escape from unsustainable path dependencies. This 'Theory of Change' serves as the backdrop to pathways to implementation in conjunction with global initiatives in Chapter 10.

A 'Theory of Change' (ToC) is defined as a basis for planning intervention in a given policy or project arena. Developing a ToC helps to identify processes whereby actions can best attain their intended consequences. The ToC approach also identifies preconditions deemed necessary to achieve desired goals. The TEEBAgriFood ToC responds to the expectation that knowledge and measurement of externalities, as assessed through valuation tools and the Framework included in this report, can be used to influence decision makers to redirect resources, products or practices so as to achieve greater sustainability in the food system. The relevant preconditions or points of entry to change in the food system include informed actors, compatible power relations, and favourable political economic conditions. The cornerstones of the ToC consist of supportive governance systems and enabling institutions as building blocks (including rules) and mindsets (both worldviews and values). Nevertheless, the specific combination of relevant entry points is context specific, corresponding to value chain conditions and a respective constellation of actors.

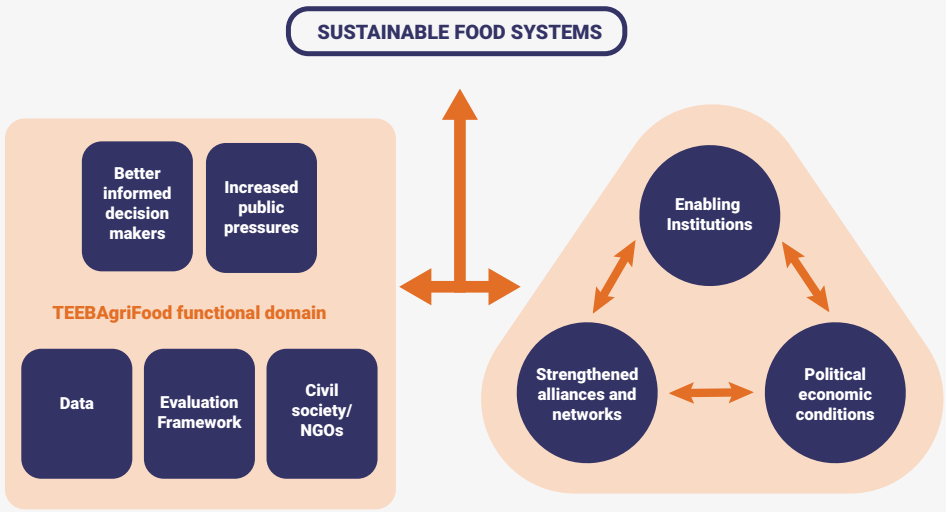
To give justice to these contextual variations, the chapter describes cases in which the TEEBAgriFood ToC may be played out. In these examples, the Evaluation Framework (see Chapter 6) is part of a "toolkit" that, in combination with countervailing public pressures and alliances, and instruments such as certification, incentives or sanctions, can be mobilized to address externalities in food chains. Since change generally implies that some stand to gain and others may lose when adopting different strategies or policies, the incidence of benefits and costs should be assessed (though a participatory approach can help assure buy-in from multiple parties from the outset).

The ToC must be sensitive to potential obstacles to change, while also suggesting ways to circumvent such obstacles, developing scenarios that consider human welfare, food security and environmental quality. While we recognize that "our ability to change our behavioural and cultural practices lags far behind our ability to manipulate the physical environment" (Wilson *et al.* 2014, p.395) the search for steps toward *intentional societal change* predominates in this discussion.

The TEEBAgriFood Framework offers a transparent and flexible approach to characterize externalities that arise in food systems. The TEEBAgriFood ToC suggests ways by which the Framework can adapt to actors' needs, limitations and strategies, in different social and strategic contexts. It provides a framework for evaluation and valuation opportunities available to key actors along food system value chains. As there is no single way forward, the chapter suggests different pathways and indeed distinct "theories of change" suitable for each of the initiatives described. A systems-wide perspective (as described in Chapter 2) is paramount, but the Framework is designed to be flexible in order that it may be tailored to a wide range of actors, including farmers, business people and consumers.

Figure 9.1 illustrates the functional domain of the TEEBAgriFood ToC within and among stakeholders to improve public knowledge and decision making processes and stimulate pressures for change. Other forces that drive and condition the political economic context, including institutions that mediate the prospects for change, such as markets and property rights, are also essential building blocks in the ToC, but are beyond TEEBAgriFood's immediate domain.

Figure 9.1 TEEBAgriFood Theory of Change functional domain (Source: authors)



The purpose of this chapter, then, is to consider the potential to influence decision makers by making clear the interconnections between food systems and human wellbeing, and of their hitherto invisible externalities and social costs. The ToC is useful in showing pathways toward: i) mainstreaming TEEBAgriFood as an analytical basis, and in consequence, ii) reforming food systems and restoring the ecosystems upon which they depend.

The chapter is structured as follows. First, we describe the recognition of the need for change in eco-agri-food systems by key actors, despite insufficient information. Use of the TEEBAgriFood Framework can also facilitate change through the dissemination of knowledge, and by appealing to peoples' growing concern with the origin and quality of the food they eat.

However, obstacles such as pushback, denial, lock-in and blockages are present in agri-food chains. In this light, the following section looks at conditions needed for successful transformational change in eco-agri-food systems. A strategy of transformative governance in eco-agri-food systems would require confronting existing power structures to press for financing to enact incentive systems necessary to motivate change. Promoting a sense of urgency is key; narratives focusing on rights, resilience and sustainability can convey a strong link between reforming the food system and improving health and quality of life.

In the following section, we show how positive pressures and strategic allies can influence principal actors in eco-agri-food systems. At the outset, we identify several counterfactual rationales that some actors (or narrower special interests) employ to push back against the pressing need for change in eco-agri-food system practices. Convincing these actors to buy in or pressuring them to concede the importance of invisible costs will greatly speed progress towards a more equitable and transparent food system.

We review several specific cases in which coalitions of actors have initiated change processes thanks to better information on externalities. Multi-stakeholder coalitions have promoted advances in certification and supply chain governance that influence broad market segments. Other processes in which additional information on food system externalities can make a crucial difference include: i) multilateral voluntary initiatives and science-policy interfaces (as a preamble to Chapter 10), ii) government decisions on incentives and sanctions at various levels, iii) due diligence procedures of the financial industry, iv) standard-setting and agribusiness coalitions, v) farm confederations promoting agroecological systems transitions at different scales and tenure arrangements, and vi) demands by consumer coalitions for food quality. Equity and health considerations are cross-cutting concerns across all such processes. For each process, we examine the chief drivers of change, including influential supporters and adversaries, as well as the roles of intermediary agents (extension workers, scientific researchers, epistemic communities, traders, supermarket chains, input suppliers, producer associations, social movements, etc.).

Enabling conditions must exist in order to allow successful transformation. Part of creating these conditions involves defining protocols and creating avenues to effectively and appropriately communicate results to different actor group. Policy decision-making and implementation contexts pose challenges but also opportunities for real progress towards a sustainable food future.

9.2 INFORMATION, AWARENESS AND COLLECTIVE ACTION ON PATH DEPENDENCY IN FOOD SYSTEMS

9.2.1 Information and denial: the politics of evidence

As other chapters have shown, the scale and intensity of externalities brought about by today's food systems have grown considerably in recent years, yet accounting for such externalities or mitigating their negative effects has not kept pace. Despite increased public scrutiny of the health and environmental effects of food and agricultural practices over the half-century since the publication of Silent Spring (Carson 1962), there remains considerable denial and pushback from the agribusiness and food supply industries as they manipulate consumer perceptions and deny the veracity of evidence supporting the need for change[1]. An informed public is a liability to some.

Relatedly, much of the information available regarding food systems is not always scientifically sound. Shepherd *et al.* (2013) and Rosenstock *et al.* (2017) reviewed 103 agricultural and environmental monitoring systems globally and found most lacked a clear conceptual framework or theory of change and were not designed with the statistical rigor necessary to ensure internal and external validity of results. Few provided a clear pathway for how the amassed data could enable actors to move from information to action. The need is not for "adequate information" but rather for more objective and concise information that responds to a clear and present need.

As a first step in defining TEEBAgriFood's Theory of Change, we posit that adequate information on the relevant costs of externalities associated with food production is either non-existent or has not been made readily available. It is also clear that providing such information in and of itself does not necessarily lead to action. Three possible reasons for this are:

1. Better information, at individual as well as organizational scale, does not easily translate into decision-making. This has been widely shown and discussed in psychology with respect to risk (e.g. health risks and tobacco) or more specifically with respect to environmental costs and risks (Weber and Johnson 2009). Rather, science-and-technology specialists insist on the primordial role of worldviews and political ideologies as leading factors influencing change. In this framework, information such as valuation and evaluation of the sustainability benefits and costs may have a positive effect only if it coincides with efforts to progressively shape visions and raise awareness that will trigger changes in value systems and in the collective deliberation process.

2. In a world of ever increasing information overload, much information is simply lost even to scientists and specialists in a given field. Doemeland and Trevino (2014) have shown, for example, that approximately one-third of the documentation made available by the World Bank is never downloaded. Although the amount of data made available speaks well for transparency, the usefulness of so much information can be called into question. This implies the need for improving the availability and access to systematic reviews and for producing evidence-retrieving and mapping instruments (McKinnon *et al.* 2015). It is also the case that information providers should not only offer what they think is needed, but respond to articulated needs. This also implies that information seekers know what they need in order to formulate good decisions. Valuations and evaluations will therefore increase their usefulness to their target audience if they are produced in a format that encourages their uptake by data systems, systematic reviews and meta-analyses. But first and foremost, they must provide information that is relevant to the questions users are facing. This is increasingly practiced in the field of environmental evaluation of policy instruments (for example, anti-deforestation policies) but should be developed as well for external agricultural costs and benefits.

3. Deliberate strategies and "strategic unknowns" (McGoey 2012; Rayner 2012) that are designed to cause confusion, defuse knowledge and generate ignorance, exist in many environmental fields such as climate change (Oreskes and Conway 2010) but also in the field of agriculture and the environment. Kleinman and Suryanarayanan (2012) have documented the case of honeybee decline and other agrochemical damages, whereas Dedieu *et al.* (2015)

1 An emblematic case of the manipulation of public opinion and misrepresentation of science by industry is that regarding the urgency of action against climate change.

describe the strategy behind the under-reporting of farm-workers pesticide poisoning in California and France. Elliott (2012) analyzes how agricultural research is oriented so as to select or block certain topics and sources, such as non-industry-funded works on GMOs. Stocking and Holstein (2009, p.25) analyze how journalists "magnify, downplay, emphasize or ignore attempts to manufacture doubts in a scientific controversy", for the case of nuisance caused by hog breeding industries on the environmental quality of nearby water bodies. This handful of examples suggests that the impact of information produced on the true costs and benefits of agriculture will not result solely from the message being diffused. Rather, it will have to overcome strategies from various groups whose interests are not aligned with these messages, and target those whose professional practice is receptive to the message (see Section 9.5).

The modern model of global agri-food enterprise tolerates little deviance from the commodity-based uniformity of mass produced and processed foods. Since the model has proven profitable, food systems nearly everywhere evolve following the same mould. Trade agreements and financial arrangements are structured to support its continuity and ubiquity. Through this process, agrobiodiversity is diminished, food options are constrained and nutritional needs are neglected. So why has change not taken root?

9.2.2 Lock-ins and path dependence

One reason the current system has persisted, deepened and expanded over the years despite increasing knowledge indicative of negative externalities, is due to what is known in evolutionary economics as "path dependence" (Nelson and Winter 1985). Theorists of societal response toward innovation and change have often noted that shifts in the *status quo* have often led to push back and blockage by those who have interests in maintaining the current system. Additionally, they have observed that "history matters"; the trajectory of economy, technology and society is largely predetermined by what came before.

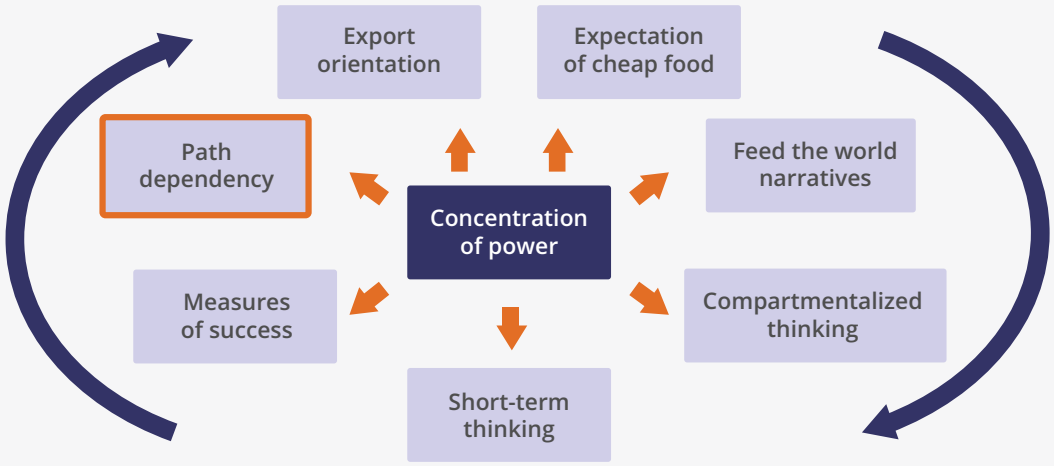
In order to explain how different policies open up or close down pathways for future development, Arthur (1989) and David (2007) pioneered the concept of lock-in and path dependency. Some policies lock us in to specific technologies and power relationships (industrial agriculture for example) and others leave open future possibilities (preserving large intact rainforests or wetlands, for example). A seemingly minor change can either open up new possibilities or restrict future options (see **Box 9.1**).

Path dependence is equally present in the case of food systems. Chhetri *et al.* (2010) simulated the ability of corn farmers in the Southeast United States to adapt to climate change based on their ease of exit from current agricultural technologies. Their model predicted substantial losses in corn productivity due to technological lock-in and the unpredictability of future climate regimes. Brown *et al.* (2014) used path dependency analysis to look at the potential for carbon sequestration from new woodland planting in Scotland in contrast to the conventional planting that would lead to net emissions. The International Panel of Experts on Sustainable Food Systems report (IPES-Food 2016) showed path dependency to be among the eight characteristics of industrial agriculture that most restrain advance toward sustainable food systems, **Figure 9.2** shows how path dependency has contributed to lock-in to a specific path in which the concentration of power plays a central role along with other drivers and narratives that help to perpetuate the system (see Section 9.3 for further details of the importance of addressing power relations as a means toward transformational change).

Box 9.1 Path dependency and the QWERTY keyboard

The classic example of the restrictions brought by path dependency is that of the QWERTY typewriter keyboard that became widespread with the success of the Remington typewriter in 1878. The QWERTY layout (named after the first five letters in the keyboard's letter arrangement) was meant to avert keys jamming, common in the Remington when typists achieved greater speed. That is, the keyboard layout was intentionally designed to avoid hitting common key combinations in rapid succession, placing them on opposite sides of the keyboard. Even though other keyboard layouts are more ergonomically efficient and healthful (the Dvorak keyboard, released in 1932, for example, saves considerable finger movement and stress over the QWERTY), once the original keyboard became established, inertia made it impossible to dislodge. People learned to type on QWERTY keyboards, manufacturers were locked-in by consumer demand, and the layout persists to this day.

Figure 9.2 Eight key lock-ins of industrial agriculture (Source: adapted from IPES-Food 2016)



Path dependency can also be harnessed for positive change. For example, the success of electric cars has reached such a critical mass that is has spurred research and technological advances in battery efficiency. These advances further "lock in" the electric car industry in a positive sense. Other such positive synergies are found in food systems, for instance with consumer concern about the health effects of saturated oils or more recently with corn-based sweeteners. After a certain point in the gradient of adoption, avoidance of such ingredients becomes a new industry norm, and thus achieves its own path dependency.

These examples suggest that although path dependency can lead to an organisation or sector becoming locked-in to a particular technological or organizational paradigm, change is still possible. Consistent with the TEEBAgriFood ToC, to effectively intervene agents of change must work at the systems level and be aware of social, spatial, temporal and symbolic dimensions of change (Sydow *et al.* 2009). Furthermore, because lock-ins may be caused by resource "stickiness" or sunk costs, the costs of change may further constrain perceived options and flexibility.

9.2.3 Why we need a theory of change

Public policies can be formulated and evaluated based on real-world behaviour in the context of non-market interactions, incomplete or excessive information, and pervasive market and government failures. Explicitly considering complexity and evolution in public policy gives rise to a rich field of inquiry, embracing diversity, bounded rationality, social interaction, path-dependence, and self-organization (Gowdy *et al.* 2016).

An emerging field of inquiry dubbed the "science of intentional change" or "directed evolution" uses some basic principles of evolutionary theory to understand and shape future development paths (Waring *et al.* 2015; Wilson and Gowdy 2013; Wilson *et al.* 2014). An evolutionary approach can address the apparent conflict between the rigidity of top-down planning and the chaos of unrestrained markets. There is a need to overcome the "silo effect", that is, a separate set of researchers and policy makers forming around each issue. To avoid this, it is important to develop a policy framework that can be applied to a diversity of policy issues—now more than ever, given extreme inequality, the prospect of disruptive climate change, and the loss of biological and cultural diversity. A combination of complexity theory and evolutionary theory has the potential to provide this general theoretical framework. Additionally, successful interventions against path dependencies have been made based on an understanding of group behaviour, as in anti-smoking and anti-littering campaigns (Richerson *et al.* 2016). These interventions relied on mobilization of collective interests

The theoretical economic framework for pricing nature to "internalize externalities" comes from neoclassical welfare economics, where the basic tools of cost benefit analysis such as "Pareto efficiency" and "shadow prices" originate. The core model of standard welfare economics assumes that individuals are perfectly rational and self-regarding. It also assumes that by "getting the prices right" it will be possible to overcome market failures through reallocation, thus permitting externalities to be internalized. However, this approach erroneously assumes that all externalities are reflected in the rational actor model of human preferences, and that to resolve them requires simply aggregating those preferences to

reflect societal concerns. Nevertheless, a fundamental theorem of welfare economics asserts that there is no logically consistent way to aggregate the preferences of diverse individuals.[2]

Yet behavioural economics has shown that people are in fact tremendously influenced by the behaviour of others. Humans are social animals, not entirely atomistic or selfish. What is needed, then, is to expand the boundaries of analysis to include complexity and feedback loops as well as consensus building and collective action. Ostrom (1990) and her followers did pioneering groundwork on the conditions for successful collective approaches to resource management that explicitly reject individual-based agendas. Ostrom and others showed that effective mobilization may arise from a combination of individual transformation and collective organization:

> *Attention is turning toward understanding and facilitating the role of individuals in collective and collaborative actions that will modify the environmentally damaging systems in which humans are embedded. Especially crucial in moving toward long-term human and environmental well-being are transformational individuals who step outside of the norm, embrace ecological principles, and inspire collective action* (Amel *et al.* 2017, p.255).

A collective action approach is needed to address the externalities associated with food systems. Such an approach explicitly recognizes biodiversity and ecosystem services as social goods. How these services are used by human societies becomes not only a matter of individual choice but also collective decision making for the common good.

An active role for government policy

The proper role of government has often been seen as limited solely to smoothing out the operation of the market by making sure externalities are properly priced and that property rights are fully assigned. But making a sharp distinction between the state and the private sector is misleading. Markets have always been shaped, supported, and constrained by government actions. As Polanyi (1944, p.140-141) put it: "The road to the free market was opened and kept open by an enormous increase in continuous, centrally organized and controlled interventionism." Indeed, for Polanyi, land, labour and money represent "fictitious commodities" as they are not created but have value conferred by the social system within which they exist and the political structures which regulate their access and use. The creation and progressive adaptation of institutions that regulate these values has occupied much of history.

Mazzucato (2015) argues that inclusive and sustainable development requires rethinking the role of government in promoting the public good — supporting not only innovation but also its direction. Building on Keynes, Mazzucato argues for an even more robust role for government, one that requires shaping and creating new markets. In this scenario, long-run public prosperity can take the place of short-term private greed. Economists have long recognized the role of the government in protecting the public good against the excesses of the unregulated market. Public policies based on scientific understandings of the natural world and human social systems can redirect the trajectory of the global economy to ensure environmental and social sustainability.

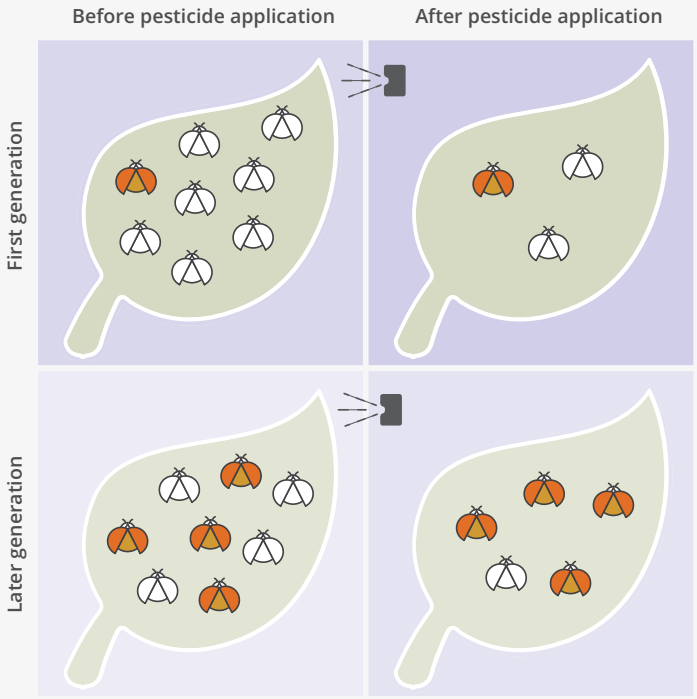
> *The important thing for Government is not to do things which individuals are doing already, and to do them a little better or a little worse; but to do those things which at present are not done at all.* — Keynes (1926, Part IV)

As mentioned above, temporal and spatial characteristics of change also need to be considered when contemplating intervention. The time period of analysis should be long enough to consider complex interactions and regular changes in external conditions. A policy that appears to be successful at one point in time may not be successful when conditions change. One example is pesticide resistance. It is not enough to observe the immediate effects of introduction of a pesticide or herbicide, which are usually quite positive in terms of crop yields. Policy makers need to consider how whole ecosystems evolve over time. We know that pesticide resistance evolves but does it evolve faster in some systems than in others? Does monoculture facilitate pesticide resistance? Or, as **Figure 9.3** describes, have pesticides simply substituted one predator for another?

Many of the challenges we face lie in the realm of what has been called "post-normal science"—characterized by extreme uncertainty and the possibility of catastrophic consequences of inaction (Funtowicz and Ravetz 1992). The global economy is a very complex evolutionary system, efficient in finding productive resources and creating economic value. Yet predicting the consequences of cumulative stress on the resilience of natural capital is difficult and controversial. There are no market signals to warn the economy of the distant but likely severe consequences of ecosystem disruption, for example, the effects of climate change in 50 or 100 years. The question is whether our fate as a species will be left to the whims of blind evolutionary forces or whether we can collectively change our trajectory with recourse to ethics, science, and reason. Can we alter the path of our social evolution? Can our global civilization take a new path toward an ethics based on collective responsibility for the common good, and, if so, what are the implications for change in food systems?

2 These represent, respectively, the First, Second and Third Fundamental Theorems of Welfare Economics (Feldman 2008).

Figure 9.3 Time sequence of pesticide resistance in pest populations (Source: adapted from https://commons.wikimedia.org/w/index.php?curid=3965987)



9.3 TRANSFORMATIONAL CHANGE IN ECO-AGRI-FOOD SYSTEM GOVERNANCE

Governance systems have traditionally been characterized by path-dependencies, as one of their main functions is to create and reproduce norms and institutions. As previously discussed, path-dependencies have in many cases undermined instead of supported environmental protection. This has contributed to lock-ins in eco-agri-food systems, which have in turn led to soil depletion, loss of biodiversity, and negative health impacts (TEEB 2015; Thompson and Scoones 2009).

With the increases in environmental degradation, climate risk and uncertainty - key challenges of the Anthropocene - there have been increasing efforts to develop new forms of governance to facilitate transformation. **Adaptive governance** incorporates flexibility into response strategies in order to respond to uncertain environmental risk (Folke *et al.* 2005), but such incremental adaptations are not always successful (Tschakert *et al.* 2010). Where risks and vulnerability are particularly grave or imminent, transformational adaptation is needed. Transformational adaptation refers to solutions that are both reactive and anticipatory in nature (Kates *et al.* 2012). For example, responding to major climate change in agricultural areas may require revised livelihood strategies and diets, as well as changes in farming practices and food systems (Rickards and Howden 2012; Vermeulen *et al.* 2013).

Anticipatory governance refers to decision-making processes that rely on foresight to reduce risk and increase adaptive capacity (Quay 2010). These include worst-case scenario strategies, or undertaking actions that work well in a variety of scenarios (Lempert and Schlesinger 2000). Governance processes that facilitate ongoing adaptation, long-term planning and proactive learning support **anticipatory governance** (Boyd and Folke 2012; Boyd *et al.* 2015). The TEEBAgriFood Framework can facilitate effective anticipatory action, as it incorporates the precautionary principle and supports development of scenarios and their quantification, and makes use of dynamic systems modelling tools for long-term planning (TEEB 2015).

The risk of future lock-in along new pathways – even with adaptive flexibility – leads to a need for transformative governance: "an approach to environmental governance that has the capacity to respond to, manage, and trigger

regime shifts in social-ecological systems (SES) at multiple scales" (Chaffin *et al.* 2016, p.399). Such transformations involve the development of new knowledge, the creation of social networks to build coalitions for change, the emergence of leaders shaping visions and guiding change, the seizing of windows of opportunity and the creation of enabling legislation (Ernstson 2011).

Achieving flexibility in governance processes requires institutions that are able to deal with changing SES contexts (Dryzek 2014). The ability to change course in response to reflection on and assessment of performance, is the opposite of path-dependency (Dryzek 2014). It implies self-critical capacity, in that a reflexive institution is able to recognize failure and learn from it (Beck *et al.* 1994). In line with the aims of TEEBAgriFood, such reflexivity enhances the capacity to take into account and value ecological systems as a basis for change in decision-making processes (Dryzek 2014; Folke *et al.* 2010).

In current agri-food governance systems, specific political economy contexts impose path-dependencies linked to entrenched power structures that disregard ecological values. The question here becomes: how can we transform governance systems in a way that weakens unsustainable path-dependencies while building ecosystemic reflexivity?

Based on recent evidence-based guidelines for policy transformation in natural resource arenas (Young and Esau 2016), we identify four areas of action that can support transformative governance in food systems. These action areas are meant not only to help to overcome path dependencies, but also to facilitate and maintain innovation towards sustainable, resilient and integrated eco-agri-food systems.

9.3.1 Ideas, knowledge and narratives – building a common language across silos

Unsustainable food systems are maintained in part by dominant narratives on industrial farming practices that encourage extreme specialization, increased productivity of commodity crops, and increased agricultural trade flows as the way to deliver food security in an overpopulated world. These 'feed the world narratives' have proven very popular despite evidence of the failures of industrial agriculture (Dryzek 1997; IPES-Food 2016; Lang 2010). Similar approaches to food security and nutrition have focused on supplementation and biofortification, whether through crop improvement or genetic manipulation with little attention to other ways to improve peoples' access to diverse diets. Nevertheless, a variety of narratives have emerged over the years that advocate for a shift from a conventional to a sustainable development paradigm in eco-agri-food systems.

From food security to food sovereignty narratives. Counter-narratives to the prevailing "feed the world" narrative can challenge social norms and achieve both local and global impact (Fairbairn 2012; Lang 2010; Martinez-Alier 2011; Phalan *et al.* 2016; Wittman 2009). For example, the Food Sovereignty Movement, which emerged in the 1980s, challenges the definition of food security grounded in increasing individual purchasing power (Edelman 2014) by means of large-scale mechanization and globalized food systems (Jarosz 2014). Instead, the food sovereignty movement aims at "transforming …food systems(s) to ensure…equitable access, control over land, water, seed, fisheries and agricultural biodiversity." (IPC 2009 cited in Jarosz 2014: 169). The movement adopts a rights-based approach that emphasizes sustainable family-farm based agricultural production and supports diversification and localization of food systems.

First developed by social movements of farmers such as La Via Campesina, this discourse has also been adopted by an increasing number of NGOs such as Slow Food and Food First. Thanks to years of advocacy, the food sovereignty narrative is now more accepted among multilateral organizations such as FAO and the World Bank. Advocates describe food sovereignty and a rights-based understanding of food security as complementary with access, distribution, security and equity, and the use of these narratives has stimulated a variety of global and local initiatives (IAASTD 2009). Global impacts include the development of the 'slow food' and the 'farm to fork' discourses and the inclusion by the FAO Council of the right to adequate food (Foran *et al.* 2014). Local level initiatives include the People's Food Policy Project in Canada and the Australian Food Sovereignty Alliance, both of which engage people in food policy decisions, and the Detroit Black Community Food Security Networks which focus on self-reliance of black communities (Schmidt 2012 cited in Jarosz 2014; White 2002 cited in Jarosz 2014). Yet food sovereignty movements have been less effective at addressing certain systemic challenges of eco-agri-food systems, such as cross-scale coordination and rural-urban linkages.

The true cost of food. Discourses on food security also include the idea that we need 'cheap food to feed the world'. Such narratives are based on cultural framing that emphasize 'cheapness, convenience… and rendering invisible the origins of food products' (Campbell 2009 cited in McMichael 2014, p.160). They contribute not just to perpetuating unsustainable food systems, but also to increasing nutritional gaps between rich and poor, with health diets catered to the affluent and highly processed food to poorer populations, leading to both malnutrition and obesity (Dixon 2009). To counter such narratives, it is necessary to expose the true cost of food, and clarify how healthy diets and sustainable food systems require externalities to be incorporated in the actual cost of food. Such counter-narratives need to be supported by more

complex scientific evidence and feedback mechanisms including science-policy interface processes to back arguments in negotiations with incumbent vested interests (Young and Esau 2016). TEEBAgriFood provides new evidence on costs and benefits that contributes to counter-narratives that take ecological values into account, exposing the true cost of food.

Agroecology and the shift from productivity to resilience narratives. Beginning in the 1970s, the discourse around agroecology directly challenged the productivity argument of dominant industrial farming practices. Agroecology concepts began to influence production practices, and contributed to the defining of sustainable agriculture (Wezel *et al.* 2009; Douglass 1984). In the 1990s, the field of agroecology expanded to include a more complete view of the global value chain of food production, distribution, and consumption, (Gliessman 2007; Francis *et al.* 2003; Kremen *et al.* 2012) calling for eco-agri-food systems that are robust and resilient (Gliessman 2007). Schipanski *et al.* (2016) suggest four integrated strategies to foster food system resilience: integrate gender equity and social justice in food security initiatives, substitute ecological processes for the use of external inputs, support localization of food distribution and waste collection and build a stronger link between human nutrition and agriculture policies.

Dissemination of such counter-narratives is essential to develop a strong case for change, reorient attention and secure political support for formulation of new agendas, rules and policy actions (Young and Esau 2016). To be effective it is important that such narratives are simple and unambiguous, and that they provide clear vision and outcomes. However, such narratives also need to be supported by scientific evidence to back arguments in negotiations with incumbent vested interests (Young and Esau 2016). TEEBAgriFood provides new evidence on costs and benefits that take ecological values into account. In general, the creation and spread of new narratives requires collective action as well as a certain critical mass of support, which is often facilitated through the work of social movements.

Agroecology represents a major paradigm shift and has triggered a variety of different initiatives and innovative social arrangements, some more successful than others. Together, they represent a powerful force for change on how we think about food systems. However, no narrative is immune from discursive struggles. The appropriation of the concept of 'agroecology' by different constituencies has led to distinct interpretations and differing agendas (Francis *et al.* 2003; Levidow 2015; Wezel *et al.* 2009). The risk that powerful transformative narratives may be co-opted is always present (IFA 2015).

Dissemination of such counter-narratives is essential in order to develop a strong case for change, reorient attention and secure political support for effective agenda setting and support the formulation of new rules and policy action (Young and Esau 2016). To be effective it is also important for such narratives to be simple and unambiguous, providing a clear vision and outcomes. In general, the creation and spread of new narratives require a certain critical mass of support, which is often facilitated through the work of social movements.

9.3.2 Redirecting structural power and financial resources

One of the most demanding aspects of transformative governance is tackling structural power. Structural power refers to the power that is conferred to actors due to their position in society. It is reflected in how state actors internalize interests of key business sectors. It often translates to 'inaction', which in our case is shown in the lack of progress towards policies supporting sustainable food systems, or in the reversal of existing supportive policies (Newell 2012).

Efforts to both challenge and persuade vested interests to change course are in progress in many contexts worldwide. In agri-food systems this effort may entail either confronting or encouraging change by multinationals engaged in agricultural input production, agribusinesses, distribution and retail chains as well as the state structures that support them. Four approaches that can assist in shifting the constellation of power are: i) Lending legitimacy and voice to existing challengers, ii) Engaging with vested interests to facilitate public commitments, iii) Building new political alliances and identifying effective policy entrepreneurs to lead these alliances, and iv) Facilitating new polycentric modes of governance that bring more voices to the table to challenge dominant vested interests.

The first approach entails lending legitimacy and voice to initiatives that support more sustainable food chains, such as Alternative Food Networks or agroecological approaches to farming. Because of the resources and formal authority that they command, state actors and intergovernmental bodies have particular power to contribute to legitimize existing initiatives. Yet legitimacy is not just bestowed by state actors embedded in hierarchical governance structures, but instead by a variety of different sources that can be mobilized by non-state actors (Bulkeley *et al.* 2014; Klijn 1996). Sources of authority include the recognition of expertise, the ability to forge consensus among different actors, and the effectiveness in delivering results.

A second approach is to directly engage with large agribusiness and processing companies and distributors along the value chain to facilitate public commitments and voluntary agreements to increase sustainability of

eco-agri-food systems. Such efforts have been facilitated by large environmental NGOs, such as Greenpeace, the World Wildlife Fund (WWF) and The Nature Conservancy (TNC) as well as by government agencies in collaboration with leading multi-nationals (see Section 9.4.1 on multi-stakeholder initiatives) (Cattau *et al.* 2016). Yet self-regulation has also been criticized for lacking ambitious enough targets and falling short on prospective aims (Meijer 2015; Oosterveer *et al.* 2014; Ruysschaert and Salles 2014). More recent pledges and commitments, such as the New York declaration on Forests, are more ambitious in their targets and include pledges by single identifiable companies (Zarin *et al.* 2016). Publicity of such commitments builds reputational accountability mechanisms to which brand-based businesses are particularly sensitive.

A third way to facilitate transition to more sustainable food systems is to build coalitions and forge new political alliances with state and non-state actors. Engaging with a variety of actors is important to achieve broad support. Reformist organizations and visionary policy entrepreneurs are essential to such coalition building (Freedman and Bess 2011; Young and Esau 2016). Without powerful policy coalitions, it is difficult to reverse policies that provide perverse incentives and subsidies in the agricultural sector (Bruckner 2016; Nesheim *et al.* 2014). Most reformist movements, such as the food sovereignty and the localization movements, have their basis in social movements, (Rosset and Martinez-Torres 2012) and although they face the risk of being co-opted, it can sometimes be necessary to ally with powerful established actors in order to influence agenda setting (Van Dyke and McCammon 2010).

The fourth approach to shift structural power is to facilitate new modes of governance in eco-agri-food systems that are polycentric, multi-level and deliberative. Polycentric processes have a greater chance of increasing inclusiveness of views and breaking up vested interests in dominant policy communities, as compared to relying on hierarchical state dominated structures (McGinnis 1999). One feature of eco-agri-food systems that reinforces path-dependencies is the high concentration of private power, including the power to dominate government policies (Bellamy and Ioris 2017). Developing governance structures that have multiple platforms and entry points into political systems multiplies the centres of power, and leads to more diffusion of power overall. Devolution of power has also been shown to facilitate cooperation at the local level among farmers and to facilitate adoption of conservation practices (Marshall 2009). Furthermore, deliberative decision making processes in polycentric governance structures help to break up path-dependencies, thus strengthening reflexivity (Dryzek 2014). This suggests that facilitating multi-stakeholder and multi-level processes can help provide platforms for less powerful voices at different levels of governance. Recent research has provided examples of framework approaches for such facilitation (Hubeau *et al.* 2017), which have promoted increased experimentation and opportunities for learning. Integrated landscape approaches support such stakeholder processes that entail recognition and participatory negotiation of diverse stakeholder interests in the context of multi-functionality of landscapes (Shames and Scherr 2013; Reed *et al.* 2016).

9.3.3 Financial resources to maintain momentum for implementation

Even when shifts in structural power are achieved and new policy decisions are agreed upon, it is important to maintain the momentum during implementation of policies. Careful design and detailed policy proposals that aim to demonstrate benefits early on can help to maintain political support and funding for implementation (Young and Esau 2016). Given the lack of long-term reliability in public funding, it is best to further embed funding within regulatory market processes to help sustain financial flows over time (Salzman 2016).

In order to support transformation in eco-agri-food systems, financial resources need to be allocated to state agencies as well as to non-state actors working on smallholder services that focus on long-term resilience and adaptation in agroecological systems. Resources may need to be diverted from national levels in order to support local and cross-level processes of integration (Blay-Palmer *et al.* 2016). This includes providing incentives to local innovation processes (which tend to be more diversified and resilience focused) as well as cross-sectoral and cross-level coordination to support policy coherence. Integrated landscape approaches put particular emphasis on cross-scale collaboration between sectors, policy actors and social groups, and require that joint investment planning processes among stakeholders are adequately funded (Shames *et al.* 2017).

9.3.4 Adaptation and learning

Transformative governance is highly dependent upon adaptation and learning processes, including flexibility in decision-making and implementation, and the ability to recognize failure and learn from it. Policy experimentation and inbuilt mechanisms that allow redirection of policy decisions are key. One simple step to embed learning in policy processes is through formal periodic reviews (Young and Esau 2016). These reviews should insure that the political, practical and scientific results of the policies reflect the intended objectives of the reform agenda. Adopting the TEEBAgriFood Framework would ensure that ecological values and ecosystems services are assessed when examining an eco-agri-food system.
In any adaptive system, trial and error approaches are part of the policy design, and help to fine-tune policies

as they are enacted. The need for adaptive responses in the eco-agri-food system is particularly important because these systems are subject to a variety of shocks which threaten food security, including climatic, socio-economic, and political issues (Thompson and Scoones 2009). With increasing climate change impacts and related uncertainties, adaptation becomes more important (Porter *et al.* 2014). Agroecological approaches have been proven to be more adaptive and resilient to climate variability than traditional agriculture (Altieri *et al.* 2015). Maintaining the biodiversity of eco-agri-food systems, addressing trade-offs in intensification, reducing environmental impacts, investing in local innovation, discouraging the use of highly productive land for animal feed, and building resilience through the support of local food systems can all contribute to build more adaptive eco-agri-food systems (Cook *et al.* 2015). Integrated landscape approaches and management can contribute to support more sustainable eco-agri-food systems (Freeman *et al.* 2015; Milder *et al.* 2011). Furthermore, built-in mechanisms that support "triple wins" that achieve climate change adaptation, mitigation and development simultaneously will support resilience and long-term sustainability (Di Gregorio *et al.* 2016; Nunan 2017).

Finally, learning and a willingness to experiment are crucial to facilitate transformation. If we understand governance as a social learning process, it becomes crucial to maintain the capacity of different government agencies, experts, actors along the value chain and consumers to negotiate goals and translate them into shared actions. 'Single-loop learning', which aims at improving results in day-to-day management practices, should be included in policy processes though formal evaluation. 'Double and triple-loop learning' are also important in adaptive and transformative governance practices (Pahl-Wostl 2009). Double loop learning helps to question the assumptions behind the very questions we ask and can thus lead to reframing, a fundamental process for disseminating new ideas and narratives (Argyris and Schön 1978). Triple loop learning reconsiders values and beliefs when assumptions no longer hold and is associated with paradigm shifts that rewrite social norms and transform institutions (Armitage *et al.* 2008). Both reflection and anticipation are needed for double and triple loop learning and these need to be explicitly built into policy-making as well as implementation processes.

Anticipatory learning focuses on the future and is particularly important for resilience and long-term planning. It involves learning from the past, monitoring and anticipating events, deliberately assuming potential future surprises, measuring anticipatory capacity and designing adaptive decision-making mechanisms (Tschakert and Dietrich 2010). Implementing the TEEBAgriFood Framework can support a number of learning objectives, as TEEB is based on a sustainable development paradigm, which includes the adoption of the precautionary principle, a long-term vision, and the inclusion of non-market values in decision-making. As such it runs counter to the current traditional eco-agri-food policy paradigm that is reactive, short-term and market-based.

9.3.5 Lessons learned for change

The TEEBAgriFood Framework benefits from the experience and lessons learned from the core TEEB initiative since the mid-2000s as well as reflection on parallel initiatives (see Chapter 1). For example, TEEB (2010) recommended the inclusion of ecosystem services values into business decision making to improve biodiversity management. To bring these values into the mainstream would require that natural capital be considered routinely in corporate strategies and operations.

Collaborative problem solving among stakeholders across sectors and competencies is required in order to achieve a common purpose with enduring policy and business ramifications. Many of those involved in the development of different approaches for business application of natural capital joined forces to form a space for collaboration, the Natural Capital Coalition. The Coalition built on the initial work of TEEB to harmonize the existing approaches into one overarching framework, the Natural Capital Protocol, launched in July 2016 (see Section 9.4.4). The Protocol helps business to identify, measure and value their impacts and dependencies on natural capital. Such information and subsequent reporting allows businesses to better manage their natural capital risks and opportunities in a transparent fashion. The ability of the Protocol to support evolution in business policy and practice informs the approach toward intentional change promoted through TEEBAgriFood, as we seek to effect business responses and value changes while working to nurture a group of diverse communities united toward change.

9.4 TEEBAGRIFOOD'S CONTRIBUTIONS TO CHANGE

This section reviews current business, policy and societal responses to the threats posed by food system externalities, including efforts to confront path dependencies, and to learn from past efforts to unite stakeholders in the search for alternatives. These include, inter alia, the undertaking of multi-stakeholder and round-table processes concerning common principles and criteria for food certification, and the role of localization and food movements on inciting change. Valuation of heretofore "invisible" costs and impacts can and has

been used to effectively support drivers of change and to launch responses on the part of diverse actors in the food system. Here we highlight the roles of key influencers, allies, adversaries and messengers. The objective is to show how applying the TEEBAgriFood Framework can support current and prospective initiatives to bring change to food systems.

In Section 9.2, above, we showed how additional information on food system externalities, while valuable in and of itself, may be insufficient to change value chains. Path dependencies and lock-ins have impeded innovation, as have mainstream economic perspectives that have fundamental limitations for collective action. In Section 9.3, we discussed the institutional preconditions for transformational change in eco-agri-food system governance.

Here we show how key actors in the eco-agri-food system can seek synergies among them that may encourage systemic change. We draw from cases presented in this and other chapters in this report to illustrate this discussion. Signals of need for change (social mobilization, boycotts, scientific and moral condemnation) became reflected in actions affecting the food system, such as third-party monitoring of moratoria on deforestation for soybean production or certification of valuable trade commodities such as coffee, cacao and others.

The intent of this section is to show the broad array of entry points for TEEBAgriFood to influence existing structures in the food system, as well as to inform and be informed by parallel initiatives underway. Both the actors and the ways in which these processes seek to influence change differ, and thus could be described as offering distinct "theories of change".

The evidence regarding external costs of eco-agri-food production and claims of global institutions in international forums have stimulated some firms to initiate change in agribusiness behaviour towards adoption of more sustainable practices. A small percentage of end consumers along with targeted NGO campaigns have helped spur change in this direction.

Such change has also come through the pressure of regulations introduced by policymakers to reduce external costs or provide offsets for compliant practices (e.g. EU agroenvironmental measures). Although some changes are policy driven, there are other forces that can drive change in agribusiness practices, such as: i) financial institutions' introduction of sustainability requirements to access funds, ii) large companies on the value chain (e.g. manufacturers, retailers) introducing sustainability requirements for purchasing products (e.g. sustainable provision of wood, palm oil), iii) consumers willing to pay for sustainable products (eco-business), and iv) non-governmental organizations and the media benefiting from the significant repercussions to be had by making claims against unsustainable practices or promoting sustainable ones.

Consequently, farmers and agribusiness managers have been compelled and/or inspired to move from a 'reactive' towards a 'proactive' stance. Foreseeing the potential risks and opportunities linked to natural, social and human capital and their management has come to represent a basis for competitiveness (Porter and Von den Linde 1995). International competition in global markets has led farmers and agribusinesses to recognize that those unable to properly manage their risks and to seize opportunities will not succeed.

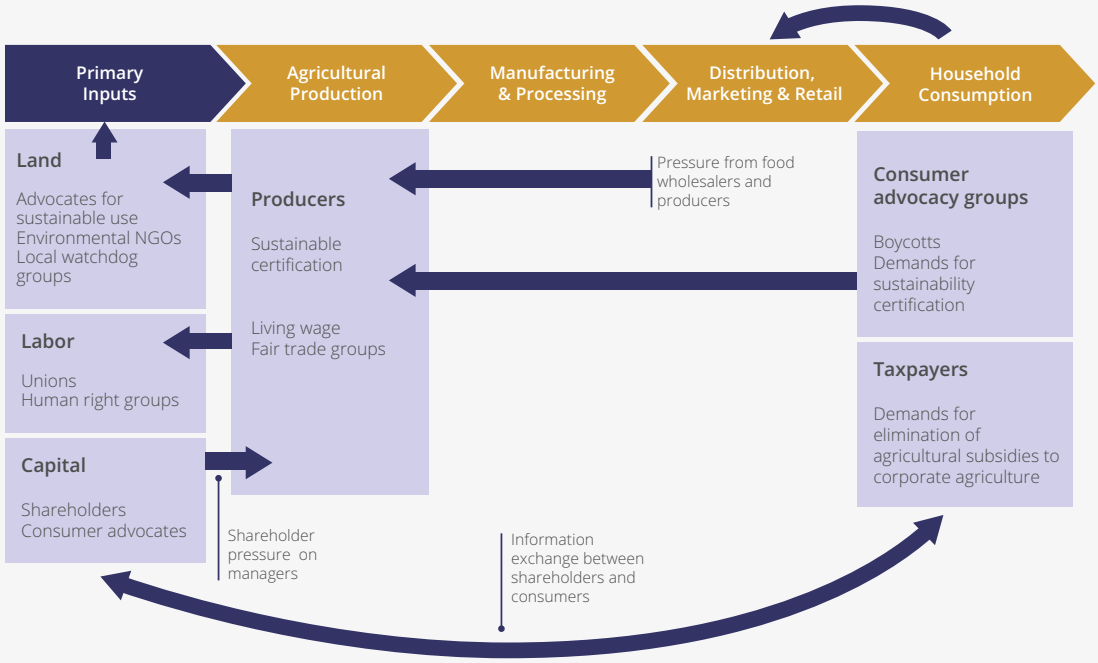
For example, ubiquitous consumption, particularly among low-income groups, of foods and beverages containing maize-based high fructose sweeteners is increasingly viewed as related to obesity and diabetes, although business interests suggest sedentary behaviour is more at fault than an improper diet (Hawkes *et al.* 2015). Nevertheless, hundreds of products now proudly advertise their brands as being free of such sweeteners as a response to consumer concerns. A proactive strategy might be to promote healthy dietary alternatives while seeking other profitable uses of surplus maize (or removing perverse incentives). Further evaluation of their externalities is a necessary step to respond more fully to these pressures.

9.4.1 Strategic campaigns and multi-stakeholder initiatives

Beginning in the 1980s, concentration within globalized agri-food value chains endowed multinational firms with increased negotiating powers. At the same time, globalization has increasingly disconnected the places of distribution and consumption from the places where commodities are produced (Porter 1998). This was accompanied by a parallel reorganization of civil society organisations (CSOs and NGOs), who adapted to the increased concentration in the food industry by restructuring themselves to mirror the changing structure of the multinational companies (Palpacuer 2008).

The role of different stakeholders in change processes must therefore be approached via their role in the value chains (Forrer and Mo 2013; Kashmanian and Moore 2014). Figure 9.4 describes the critical points along food systems on which CSO/NGO coalitions have acted jointly with progressive business organisations, consumers, taxpayers and labour advocates to place pressures upon the formation of value chains. By strengthening flows of information and other resources, such coalitions have served as enabling agents of transformational change.

Figure 9.4 Transformational change through strengthening the connections in the value chain, indicating key pressure points (arrows) (Source: authors)



The upsurge of involvement of NGOs in the critique of agri-food value chains reflects an evolving perception of their role in society as agents of change. There is a growing recognition that downstream segments of the agri-food value chain (i.e., distribution, consumers) can influence nodes on the production and inputs end. Putting pressure on brands and on distribution firms forces them to turn to their suppliers and demand (and pay) for more sustainable products; this should in turn force the suppliers to ask for more sustainably produced raw material, and so on, back up to the producers. Once this movement is initiated, it can progressively become mainstream in the whole industry as competing firms align to preserve their market shares. Increasing the negotiating power of the producers can allow them to change their production system towards one that is more sustainable (e.g. sending children to school instead of to the fields, creating better working conditions and wages for agricultural workers, reducing the use of pesticides, eliminating the cutting down of high value forests, etc.).

Social justice and rights-based NGOs were the first to adapt to increased concentration in the agri-food industry and to design campaigns targeting brand owner companies. They pressured firms to better discriminate their supply sources and to dispense with the most irresponsible companies. The first campaigns of this type were carried out by North American organizations aiming at textile brands, forcing the companies to impose guarantees on their suppliers concerning working conditions and in particular to prohibit child labour (Armbruster-Sandoval 2003). Environmental NGOs later followed their lead.

Two examples of this process include the case of soybean production in Brazil and palm oil production in Indonesia. Soybean crops, mainly grown for cattle feed, are implicated in deforestation pressures in Brazil (Macedo *et al.* 2008). These pressures were the subject of a major campaign by Greenpeace entitled "Eating up the Amazon" (Greenpeace 2006), and later "Slaughtering the Amazon" (Greenpeace 2009) to refer more specifically to cattle ranching, denouncing the progression of deforestation and slavery.

These campaigns were widely publicized and targeted the large agri-food companies that controlled the bulk of exports (Cargill, ADM, Bunge and AMaggi) as well as banks (IFC and European banks). They also targeted the main actors of the European meat sector, including fast food chains and traders. The action took place at the end of a period of major agro-industrial expansion in Brazil, at a time when some governmental measures against rampant deforestation had been undertaken (Nepstad *et al.* 2014), but NGOs found these measures insufficient to bring significant reduction in forest degradation. Supporting the narrative was robust scientific evidence from satellite monitoring systems showing large-scale conversion of forest to soy between 2001 and 2006. This

evidence was instrumental in recruiting major retailers such as McDonald's to act and sign the first zero-deforestation agreement in the tropics.

As a result of this campaign, and with the help of low prices at that time, the change in the power relationship gave birth to a renewed dialogue between the major stakeholders of the industry (led by the oilseed crushers' association ABIOVE), the government and NGOs (Cooper 2009). This resulted in the first historical example of voluntary industry-wide individual commitments to a "zero deforestation" policy, known as the "soy moratorium". Monitoring systems able to identify violating farms facilitated enforcement of the policy and reported a high compliance level (Kastens *et al.* 2017; Rudorff *et al.* 2011).

This wholly voluntary measure is now considered one of the decisive factors in securing broader agricultural sector commitments toward reducing the deforestation of the Amazon. Proposals for its termination and to pass control to government regulation after ten years were considered premature, due to the need to resist the surge in deforestation that has been associated with the current Brazilian economic crisis However, the current overall effect of these commitments on the transformation of practices and ultimately on deforestation and working conditions are still uncertain (Aubert *et al.* 2017a).

Palm oil in South-East Asia represents yet another major example of a campaign that resulted in corporate commitments to sustainable production concerns. Responding to the growing concerns about deforestation in Indonesia and Malaysia, WWF built upon its experience with forest certification (having been the initial sponsors of the Forest Stewardship Council), and launched a certification platform for sustainable palm oil production (Roundtable on Sustainable Palm Oil, RSPO).

While RSPO was taking a growing share of the market, some NGOs, particularly Greenpeace and Friends of the Earth, left the board and denounced the inadequacies of certification to combat deforestation and promote improved working conditions (see also in particular Poynton (2015)). The Greenpeace campaign was called "cooking the climate" (Greenpeace 2007) in reference to the effects of draining the Asian peat lands to allow for palm oil growing, which results in global warming. These campaigns targeted the major players upstream of the value chain, such as Golden Agri Resources, Golden Hope or Wilmar, followed by major downstream companies (Unilever, Nestlé, Procter & Gamble). Initial commitments were made by two major trading and processing companies (GAR, then Wilmar) as a result of the impact of these campaigns on brand reputation and consumers' behaviour. These oil palm players committed themselves to generate "zero deforestation, zero (use of) peat and zero exploitation" and go beyond the requirements of RSPO certification. These first commitments initiated a domino effect, when two other major operators (Cargill and Asian Agri) adopted the same pledge in September 2014, not only for their own operations but also for their suppliers and their affiliates.

In some specific cases, initiatives have been successful in bringing attention of the broader public to the relationship between consumption, production and sustainable food systems. However, the results have been mixed, and are often temporary until pressure is reduced. A more thoroughgoing theory of change presupposes the need for an enduring paradigm shift. Such a shift requires examination of hidden external costs to different actors in the value chain, and the development of adequate mechanisms to monitor and validate the commitments assumed by the industry.

9.4.2 Eco-agri-food certification processes

Certification and associated multi-stakeholder processes represent a phenomenon of the late 20th Century described as non-state regulation (Bernstein and Cashore 2007) that has been exceptionally effective in alerting society and responsible stakeholders of the need for better scrutiny of eco-agri-food supply chains. Although the State may be engaged as a participant, decisions are often reached by consensus among social movements or labour unions, and environmental and business representatives on the principles and criteria to be adopted across a given commodity or supply chain, enhancing the value of the product to the consumer.

Certification or sustainability standards emerged at the end of the 1990s, in parallel with rising critiques of the social and environmental impacts of globalized trade on labour conditions and on the environment. They are intimately linked with NGO campaigning, since certification can be seen as a way to respond to critiques with a collaborative approach. Standards have been implemented in the forestry and agriculture sectors for at least two decades with different levels of adherence across regions, crops or value chains.

The first certifications addressed trade (Fair Trade labelling), and forest protection (with the Forest Stewardship Council initiated by WWF). Certification initiatives were further developed in the 2000s around the issues raised by agri-food commodities, with soybean certification (Roundtable on Responsible Soy, RTRS), sugar (Bonsucro), sustainable palm oil (RSPO), or Roundtable on Sustainable Biomaterials (RSB).

The TEEBAgriFood ToC rests on the assumption that inadequate prices are paid to farmers and that insufficient attention is paid to agri-food production processes and their associated social relations by multinational

companies and by markets in general. It is also based on observing a gap between the concern for social and environmental sustainability on the consumer side versus that espoused by traditional regulatory agencies, the latter tending to favour industrialization and economic growth at the expense of social and natural capital. The TEEB approach suggests certification should complement regulatory practice, which should serve as a point of departure for more rigorous quality demands. Revealing hidden external costs associated with unsustainable supply chains is a missing aspect in the development of certification. TEEBAgriFood studies can thus permit that certification become more effective in clarifying the need for greater investment in quality controls.

The intensity and speed of implementation of regulatory standards in a specific country is influenced by variables such as economy (GDP, export or national market), level of governance and the social context (van Kooten *et al.* 2005). It also depends on the organization of the production sector and its value chain and the visibility of the certified raw material as an ingredient or a final product for consumers (Pinto *et al.* 2014a). Nevertheless, substantial growth in standards compliance occurred over the past decade for crops such as coffee, cocoa, tea, forest plantations (mainly eucalyptus for pulp and paper) and palm oil (Potts *et al.* 2014). This growth is a consequence of increased consumer awareness and the leadership of food and other enterprises, which have made public commitments to source certified commodities and ingredients.

Although certification holds a prominent position in sustainability initiatives, its impact on development processes and natural capital conservation and its ability to lead transformations of eco-agri-food systems is still quite controversial. Despite an increase in number and area of certified crops, the overall impact of certification in improving social, environmental, agricultural and silvicultural performance in the field (though widely touted by certifiers and certified producers alike) is still limited and lacking in counterfactual evidence, as is credible scientific data about the impacts or performance of most initiatives (COSA 2013)[3]. When considered at a landscape scale, the offsite impacts of certification would be more significant if certification were combined with integrated landscape initiatives (Deprez and Miller 2014).

A recent comprehensive meta-analysis brought together the results of more than 40 studies and surveys from different sectors of the economy and their respective certification systems. Results concluded that sustainability standards offer a broad range of business benefits throughout an individual firm's supply chain that can be materialized in its corporate value and in the overall sector in which it is inserted (Molenaar and Kessler 2017). The study identified key short-term results: price premiums, market access, access to finance, better supply chain risk management and operational improvements. The long-term results identified included increased profits, lower costs and improved reputation. In agreement with the long-term expectations for the TEEBAgriFood Theory of Change, there is no final point – just continuous performance improvement as conditions and challenges constantly change (see **Box 9.3**).

Three of certification's ostensible objectives can help assess its actual or potential effectiveness to induce a change in eco-agri-food systems and relate to the TEEBAgriFood Theory of Change:

1. Increasing primary producers' remuneration in comparison to non-certified products, to compensate for certification requirements and to improve producers' economic and social situation, thus increasing their share of the value added, and fostering a commitment to sustainable production paths.

2. Initiating a change in the prevalence of practices decried in targeted sustainability issues: child labour, slavery, deforestation, etc.

3. Reaching a critical mass of primary producers in the regions concerned so as to achieve broader objectives for social and environmental sustainability.

Issues, doubts and ways forward are illustrated below with: i) a case of a specific commodity certification, namely that of palm oil (**Box 9.2**) and ii) a case study of a number of certified supply chains in Brazil (**Box 9.3**). Although these two examples illustrate initiatives with respect to tropical deforestation, initiatives of this type are not restricted to such contexts. For instance, organic farming or other types of labelling may also address water quality, grasslands, the local origin of production, or animal welfare, etc.

3 This implies such measures as using good protocols, addressing counterfactuals, and statistical significance (COSA 2013). COSA is a neutral global consortium of organizations whose mission is to accelerate sustainability in agriculture via practical assessment tools that advance our understanding of social, economic, and environmental impacts.

Box 9.2 Assessing palm oil certification impacts

Regarding the premium obtained on sale of certified palm oil, the various standard managing organizations (RSPO, International Sustainability and Carbon Certification-ISCC, and Rainforest Alliance) provide very little information. Although slightly dated, a report by WWF *et al.* (2012) indicates a premium of US$ 25 to $ 50 / ton (i.e. 2.5 cents / kilo) for RSPO certified oil, depending on the marketing mode. Aubert *et al.* (2017b), however, indicated a similar albeit slightly lower premium range for ISCC and for RSPO certificates, from US$ 20 to $ 40 / ton. Two assessments made by WWF (Preusser 2015; WWF *et al.* 2012) show that certification makes it possible to improve the productivity of a plantation (sometimes by 40 per cent or more) and to some extent to reduce production costs (reduction of conflicts, use of inputs, improvement of internal procedures, etc.). But the reports also show that certification had no direct impact on the income or profit of the large operators involved in certification. Neither has palm oil certification significantly increased the negotiating powers of smallholders, thus raising doubt as to its capacity to improve their share of the value added (Hidayat *et al.* 2016).

Regarding working conditions, Amnesty International (2016) shows evidence of forms of forced labour, unsafe working conditions and underemployment of wage-earning workers, even on certified oil palm plantations. This seems to confirm that the standards have brought few improvements in the labour conditions on plantations. Lastly, with respect to deforestation, a report by the Environmental Investigation Agency and Grassroots (2015) suggests that monitoring and auditing may be partial and biased: high conservation value forests as well as land conflicts are sometimes deliberately omitted from audits.

Regarding the ability of certification to reach a critical mass and make it possible to transform the industry in producing regions, it must be observed that not more than 50 per cent of certified palm oil has been sold as such since the beginning of the RSPO (i.e. the other half is sold as conventional oil even if produced with RSPO standards), and this proportion has not improved lately (see RSPO [2015, p.4]). Indeed, many downstream brand companies still remain below their RSPO certified procurement targets (WWF 2016). Moreover, some firms tend to turn to other sustainable procurement strategies that are not based on certification (see above section on campaigning and voluntary commitments). In particular, only one quarter of Nestlé's palm oil procurement is certified (WWF 2016, p.22), but the company has been very much involved in a traceability approach and a voluntary commitment to "No deforestation, No peat, No operation" in particular with the support of the organization The Forest Trust.

In addition, Indonesian and Malaysian governments recently voiced their concerns about letting Northern NGOs and private companies decide matters affecting the countries' sovereign development. They created their own "national" certifications, which they claimed would be more manageable. Such competing national certification schemes gained some modest adherence from businesses. However, from a consumer perspective, such schemes did not offer sufficient confidence for their claims to make their labels competitive with non-state approaches.

Box 9.3 Assessing certification's impact on Brazilian agriculture

Brazil is a key country in the production of tropical commodities and is a leader in certification of timber, coffee, sugarcane, cattle and soy. There are 69 types of standards, protocols and codes for sustainability applied to Brazilian agriculture with a wide range of sectors, crops, levels of assurance, impacts and transparency (ITC 2017). Some parts of these certification schemes cover goods up to final consumption while others offer attributes of quality or guarantees only for parts of the value chain. Learnings from implementation of certified eco-agri-food systems in Brazil are summarized here, based on experience with the Sustainable Agriculture Network (SAN)-Rainforest Alliance (involved with certifying coffee, cocoa, oranges, other fruits and cattle). In 2015 there were around 200,000 ha of SAN-Rainforest Alliance certified crops and animals on more than 500 farms in the country (Imaflora 2016), a miniscule though growing proportion of Brazil's agricultural sector.

Certified farms and forests are different and have higher net positive environmental and social performance than similar non-certified ones (Lima *et al.* 2009; Hardt *et al.* 2015). Pinto *et al.* (2014a) concluded that certification contributed to the conservation of natural vegetation and biodiversity in Brazil. Hardt *et al.* (2015) affirmed however that certified and non-certified coffee farms already showed such differences before the first audit occurred. The most important structural changes in fact occur on a farm when it prepares to be certified (Pinto *et al.* 2017). Despite this, Ferris *et al.* (2016) found that continuous improvement and progress of social and environmental performance occurs over time after initial certification, in both the short and long term. Progress is incremental, with fluctuations that include advances and setbacks as the performance of farms is influenced by external factors like prices of commodities, changes in climate and harvest, changes in leadership, among other external and internal factors.

Several authors (Ferris *et al.* 2016; Hardt *et al.* 2015; Campos 2016) showed that many certified farms are not in full conformity with legal requirements, ranging from basic workers' rights and guarantees (potable water, payment of salaries) to structural changes (forestry restoration, inadequate agronomic practices, needs for improvement in management and legal compliance). However, they had higher levels of compliance with other environmental and labour regulations than non-certified farms.

Pinto (2014) found that early adopters of certification were professional producers with large farms, high productivity, and high levels of technology and management in their business and operations. Later, some medium and small producers were attracted to SAN through group certifications, but they had previously been organized collectively, had high productivity and had received some form of outside support to achieve certification; other small and medium farms were unable to qualify for reasons listed below (Pinto *et al.* 2014b; Pinto and McDermott 2013).

In comparing the economic performance of certified and non-certified coffee farms, Bini *et al.* (2015) found that certified farms had higher productivity and revenues, a trend toward lower production costs, and had obtained similar prices for coffee sales to those of non-certified producers. Their higher profitability was thus derived from greater management efficiency rather than price premiums.

Despite this, it appears that the expectation of tangible economic benefits (especially in differentiated and over-priced markets) is the principal motivation for producers to seek certification, while investments needed for the changes required by certification, gaps in legal compliance and access to information are the main barriers identified by coffee producers to begin the certification process (Adshead 2015; Pinto *et al.* 2016).

Lessons derived from certification

Despite considerable uptake as a measure of change in eco-agri-food systems, certification has been severely criticized as a limited intervention in promoting sustainability. The present trend is to search "beyond certification". Such criticism comes from the expectation that standards and certification would stand alone, acting as a single solution to sustainability challenges in production systems, sectors and value chains. However, standards should be seen as part of a complementary mosaic of solutions (Pinto *et al.* 2016; Newton *et al.* 2014). Interventions become relevant when they reach a minimum level of implementation, sufficient to demonstrate the viability of a different or improved model of production and to influence decision and policy-makers in governments and companies. Although there is evidence that certification has contributed to transform value chains, the evidence suggests that it has not yet brought about large-scale territorial or landscape changes or caused structural changes in livelihoods across countries.

The future of certification as an instrument to support the transition toward eco-agri-food system sustainability depends on its attainment of greater impact at a landscape scale and connection and complementarity with other private and governmental initiatives to foment and induce sustainability. The fundamental debate is not about the potential to upscale certification itself, but how certification could contribute to the upscaling of sustainability. A move "beyond certification" should allow standards and certification to contribute more effectively to the upscaling of sustainability in the agriculture and food sectors. As a multi-pronged sustainability strategy, it should have synergies with other interventions aiming to eliminate predatory and illegal practices, including moratoria and other commitments and tools dedicated to stop deforestation, decrease emissions of greenhouse gases and eliminate slave and child labour. Other instruments worth mentioning are bounded or conditional credit, when farmers receive credits tied to environment-friendly management (Gross *et al.* 2016), and landscape (or jurisdictional) approaches where the sustainability of production is managed at the scale of a territory, based on a co-operation between local governments, businesses and NGOs (Aubert *et al.* 2017b). However, stakeholders should be cautious and aware that measures directed toward improvements along these lines should both interact with and complement high performance standards. More research is needed to understand better how compliance costs could be reduced and effectiveness of sustainable practices enhanced.

If urgent and short-term interventions are needed to eliminate the worst practices in the agri-food system, other medium and long-term solutions and tools are needed to foster the best. Any intervention (like certification) may reach a tipping point when its essential logic infiltrates a sector or value chain. A tipping point is reached with certification when the collective actions necessary to meet standards become an integral part of the policy, research, supportive institutions and resources, etc., of mainstream decision makers involved in this sector, be they private or public. For instance, a tipping point for coffee, cocoa, tea, and palm oil has been reached, but not for sugarcane,

soya or cattle. For the former, every event, company policy and research agenda includes certification as a subject. Therefore, the certification frame has highly influenced the entire agenda for the sector. The TEEBAgriFood theory of change implies engaging a critical mass of firms so that revealing hidden costs becomes a standard for reporting and adjustment. A TEEB assessment would serve as a basis for benchmarking and competitive advantage in the relevant food segment, a standard of business performance.

9.4.3 Multilateral agreements and science-policy interface processes[4]

A host of multilateral agreements and agendas in force or under negotiation represent strategic opportunities for the exposure of hidden costs in the food system, and means to address them through policies and trade measures. Among the most significant are the global framework conventions on climate and biodiversity, and their respective implementing instruments related to reduction in emissions, equitable benefits sharing and intellectual property rights. These concerns interact with a wide realm of multilateral accords addressing trade, development and finance, which are pertinent to food system governance. However, the scope of this section will limit itself to environmental agreements and related agricultural policy measures.

These agreements aim to meet their objectives by promoting good land use and forestry practices and encouraging resource conservation[5]. The results, such as those obtained through the differential incentive approach incorporated in the European agro-environmental measures under the Common Agricultural Policy (CAP), show that protection of multifunctional natural landscapes on private farmlands has been uneven and in many areas the program is undersubscribed. Complementary measures sensitive to national, global and local contexts may be essential to achieve the goals of multilateral agreements (Santos *et al.* 2015). TEEBAgriFood can promote greater knowledge of the additional offsite benefits that arise from good practices on the farm field, practices that should be more adequately remunerated through policy and markets. This in turn reinforces the need for interdisciplinary thinking across silos to coordinate disparate objectives.

More and more, the adoption of multilateral agreements on complex themes has been accomplished through processes subject to voluntary agreement and periodic review rather than rigid controls or sanctions (see Chapter 10). The growing complexity of such agreements requires integrated thinking, institutional learning and innovation. This context of voluntary undertakings makes TEEBAgriFood especially useful in identifying trade-offs and values associated with alternative actionable agendas. On the other hand, it is important to recognize the critical role played by major actors in the food system whether in resisting or directing the need for change, as emphasized throughout this chapter. For this reason, it is essential for TEEBAgriFood to seek allies among such actors and across the spectrum of concerned players in the food system to shape voluntary agreements.

As a strategic means of introducing the approaches embodied in the TEEBAgriFood Framework to multilateral decision-making, this report (see Chapter 10) proposes a specific focus on the implementation of the Sustainable Development Goals (SDGs) and the 2030 Agenda. Both relate to a host of concerns pertinent to change in food systems globally, as well as the interaction between eco-agri-food sectorial goals and human wellbeing, particularly poverty alleviation, health, and human rights, including the right to food. For TEEBAgriFood to fulfil its promise at the level of multilateral agreements implies a theory of change that can only be satisfied through innovative ("out of the box") thinking, knowledge sharing and institutional learning by all actors engaged in their negotiation, factors also critical to progress toward the SDGs.

Tension at the multilateral level often arises due to the nature of competitive global markets and concern for national sovereignty. Successful efforts to combat externalities require coordination and cooperation among actors, as discussed under Section 3.1. Progress in negotiating such measures can falter when States perceive that national sovereignty over their developmental destinies is being undermined. For example, barriers to concerted action on deforestation in many countries were overcome by debate among actors in successive conferences of the parties to the UNFCCC. Stakeholder engagement to identify cross-sectorial policy factors affecting observable change in land use behaviour led to greater impact of REDD+ measures (measures aimed at reducing emissions from deforestation and forest degradation) and improved the coordination of associated policy instruments (Young and Bird 2015; Sills *et al.* 2015). This experience gives additional credence to a theory of change vested in conciliation among stakeholders to achieve consensus on complex problems. It is important to be clear, however, that consensus is not always possible without dilution of policy goals. Thus, it is necessary to make explicit the reasons for reluctance by key actors and to negotiate means to override their resistance (e.g. through conditions or compensation).

4 This section is keyed to further discussion that is the focus of implementation of such accords and TEEBAgriFood's role in this, in Chapter 10.

5 These include, inter alia, the dictates of the UNFCCC related to reduced emissions from deforestation and degradation (REDD+), and the Aichi targets for implementation of the Convention on Biodiversity relative to conservation in the productive landscape and degraded land restoration.

The effectiveness of global accords as they translate to policy and transformational practices on the ground is often far more complex to trace. One notable exception relates to the gradual improvement in the regulations surrounding the UNFCCC Clean Development Mechanism (CDM) and later REDD+ to enable "jurisdictional" interventions among groups of smaller scale projects. This change, responding to concerns for equitable access by small and medium enterprises, overcame barriers to entry arising from the high transactions costs of CDM initiatives whose timeline from approving baselines through implementation often took years. The flexibility imparted to the CDM resembles similar openings that have arisen out of other global agreements (e.g. rewarding traditional people for their knowledge of agrobiodiversity or territorial protection of carbon stocks by indigenous peoples). Their relative success in influencing negotiators and gatekeepers in the global accord and associated grant funding institutions has been a function of the effective mobilization of target groups along with the support of international advocacy and epistemic communities. Allies within national governments and international NGOs have also played key roles in bringing about such strategic change.

Food systems are the subject of considerable discussion among a plethora of science-policy interface (SPI) initiatives. Bringing global actors together around common objectives often implies the need to bridge different knowledge, value and belief systems. The relevance of SPI results depends on their utility in addressing policy problems. Generating and communicating scientific knowledge alone is insufficient to make significant progress on sustainability (Turnhout *et al.* 2012).

A case in point is that of a recently released assessment of pollinators, pollination and food production (IPBES 2016). This assessment benefitted from feedback obtained from regional producer organizations and beekeepers who mapped the occurrence of pollination deficits in agricultural crops, pinpointing possible sources of damage to pollinator populations such as excessive pesticide application. Such assessments have the potential to achieve considerable influence over concerned groups and may contribute to societal recognition of the problem, so affecting regulatory decisions (Pascual *et al.* 2017). However, it is our contention such an assessment would be more effective if completed with the contributions of the TEEBAgriFood Framework, which allow an accounting of the indirect drivers of biodiversity and ecosystem service loss including harmful subsidies and other factors promoting unsustainable agriculture (Rankovic *et al.* 2016), and hidden costs faced by society for such losses, as in the case of the pollination deficit.

9.4.4 Instruments to change government and overseas assistance policy

In practical terms, beyond the TEEBAgriFood Evaluation Framework, the accompanying assessment of the costs of policy inaction has proven highly effective in asserting the need for reshaping policies and intergovernmental cooperation at different levels. The assessment of the enormous costs in infrastructure and crop productivity associated with predicted losses of ecosystem services and terrestrial sinks helped to spur greater investment in needed research and policy action. Here too, the evaluation of consequences of such change requires interdisciplinary thinking and consultation among stakeholders to map plausible scenarios and to imagine the effects of specific interventions, consistent with the TEEBAgriFood theory of change. It should be noted that a recent consultation of agribusiness and food industry companies indicates that a lack of complementary government actions was a major constraint for their effective participation in multi-stakeholder landscape partnerships (Scherr *et al.* 2017).

TEEBAgriFood has potential to add considerable value to the arena of public finance and international development cooperation, where the consequences of unsustainable paths of expansion in food systems are in dire need of better assessment. This became clear even in the initial stage of TEEBAgriFood, where the food systems in focus were accompanied by obvious and significant externalities along their value chains. The results of the Addis Ababa Action Agenda indicate the need to provide greater support toward public-private partnerships in strategic areas of investment for development assistance, including infrastructure and technology. The sustainability goals articulated the same year by the United Nations could similarly leverage TEEBAgriFood's influence to a wide scope of both public policy and private sector endeavours. As one example of governmental fiscal measures compatible with the Agenda, taxation on sweetened beverages as an instrument to motivate change in consumer behaviour to promote healthier diets has been adopted in over 30 countries to date on a trial basis in localities in both the US and Mexico (see **Box 9.4**). At the national level, the case of pesticide taxation adopted in Thailand discussed in Chapter 8 offers a similar perspective. On the other hand, although taxes can reduce consumption and raise revenues that can be channelled to combat externalities, subsidies and other incentives can distort and create excess demand.

Box 9.4 Experience with taxation on sweetened beverages

The causal link between ubiquitous use of maize-based sweeteners and public health costs due to growing rates of obesity has been made effectively by lawmakers worldwide, resulting in the adoption of soft drink taxes to depress demand. The effects of these taxes, passed initially by voters in Berkeley, California was traced to a 21 per cent drop in soft drink consumption four months after the measure was adopted. A parallel study in Mexico found a 17 per cent drop in consumption of such beverages among low-income households after a one peso per litre tax was adopted on soft drinks in 2013 (Sanger-Katz 2016). "Such levies have been enacted in 30 countries, including India, Saudi Arabia, South Africa, Thailand, Britain and Brunei. More than a billion people now live in places where such taxes have driven up the price of sugar-sweetened beverages", illustrating the potential importance of economic incentives on consumer behaviour (Jacobs and Richtel 2017). Such effects can be even more pronounced if coupled with information for consumers regarding nutritional and health benefits of restricted soft drink consumption.

TEEBAgriFood has the potential to reshape rural-urban economic and ecological relationships by influencing urban and regional government officials recently exposed to agriculture and food security narratives, who are conceivably more open to test new models (Forster and Escudero 2014).

9.4.5 Influencing financial sector roles in the food system

The finance sector is increasingly aware that environmental and social dependencies of their clients and investees increase the sector's risk exposure. Examples include situations in which clients are unable to fulfil financial obligations due to disruptions in natural capital service provision (water, pollination, etc.) or when financial institutions experience losses of asset values due to environmental impacts. Finance institutions are progressing in the assessment of these impacts and dependencies in order to reduce their risk exposure and to direct their lending, investment and insurance services towards activities with lower impacts and dependencies on natural and social capital.

These processes have garnered greater significance with the issuance of the Addis Ababa Action Agenda (AAAA) on sustainable finance, under whose rubric a number of commitments have been made to address both public and private sector investment for development. TEEBAgriFood has identified the AAAA as an important opportunity for indicating key areas for investment in critical nodes of food systems, and to sensitize such investment to the need to conserve natural capital stocks (see Chapter 10).

The Equator Principles is a framework adopted by major finance sector institutions to introduce environmental and social criteria into their lending decisions. The Equator Principles provide a minimum standard for due diligence to support responsible risk decision-making (Equator Principles 2013). This frame is used to evaluate major infrastructure and industrial projects, with a capital cost over US$ 10 million. Borrowers unable to comply with the social and environmental policies and procedures of the finance lender are denied access to funds. As of 2017, 91 financial institutions representing 70 per cent of international Project Finance debt in emerging markets had signed on to the Equator Principles. The Equator Principles still fall short in ensuring financial sector accountability (WWF 2006; Wörsdörfer 2013). The TEEBAgriFood Framework can improve the accountability of lending projects related to the agribusiness sector by making visible the external costs of such investments.

A growing appetite for sustainability investing is leading to increasing demand for information to support decision-making (Macpherson and Ulrich 2017). The use of sustainable financial market indicators, such as the Dow Jones Sustainability Indices, provide information on incorporation of environmental, social and governance criteria (ESG) by large companies[6] at the global level. Other initiatives on disclosure of sustainable information include the Carbon Disclosure Project (CDP), which informs investors how investee entities manage their climate and water impacts. Similarly, the Recommendations of the Task Force on Climate Related Financial Disclosure (TCFD 2017) provide guidance for voluntary and consistent climate-related financial risk disclosure by companies to better inform financial institutions and other stakeholders. In this context of growing interest, the TEEBAgriFood Framework can contribute by providing a framework for valuation and evaluation of environmental and social aspects to help agribusiness companies provide more complete information to investors as well as enable investors to identify key concerns to guide their investment decisions.

Apart of these disclosure initiatives and frames for risk assessment in project finance, the assessment by the finance sector of natural capital risk and opportunity is currently highly focused on water risk exposure and

6 In 2016, 3400 companies were invited to participate on the Corporate Sustainability assessment to elaborate the Indices.

climate change, both closely related to the agribusiness sector. Some examples of tools used by the finance sector for the assessment of natural capital risk and dependencies are water resilience assessment tools developed by the Natural Capital Finance Alliance (NCFA)[7]. The finance sector has made progress on the assessment of water and climate risks but there is a need for a more comprehensive understanding of the relations between the finance sector and natural capital. The Finance Sector Supplement to the Natural Capital Protocol[8] is intended to fill this gap and provide a more robust and holistic view regarding natural capital to financial institutions. The contributions of the Supplement compared to other existing approaches consists of:

- Broadening the scope of assessment by including both impacts as well as dependencies on natural capital of clients and investees;
- Promoting the measurement of impact drivers and dependencies but also their valuation from a financial and/or societal point of view; and
- Analysing natural capital in a more systemic way, moving from an analysis of impacts on climate and water alone to a more holistic and integrated view that integrates a broader range of interconnected aspects (including biodiversity, soil, water quality, etc.).

A draft version of the Finance Sector Supplement was published in May 2017 (Natural Capital Coalition 2017). After a consultation and piloting phase, a final version of the Supplement will be published at the beginning of 2018. The Finance Sector Supplement and the TEEBAgriFood Framework are closely aligned. TEEBAgriFood is written for a broader audience, but it will provide complementary insights on the assessment of social impacts (health, equity, etc.) and dependencies enabling the inclusion of social capital into the assessment of agribusiness companies by financial institutions. There may also be potential by coalitions of investors and local stakeholders to recruit and coordinate investments to influence food systems in particular geographies, including actions on farms, ecological connectivity, natural and built infrastructure, supporting certification, reforestation and grassland restoration, soil restoration, etc.

9.4.6 Instruments for sustainable eco-agri-food business practice

Two of the five major external costs identified by Trucost (2013) at global level are generated by the eco-agri-food sector, namely: land use change due to cattle ranching and farming in South America and water consumption due to wheat farming in Southern Asia. Agriculture and seafood are among the economic sectors that pose the greatest threat to critical ecosystems through impacts such as soil erosion, air, land and water pollution, deforestation of habitats and species reduction (WWF 2012).

The eco-agri-food sector not only impacts on natural capital but also depends on it. Deeply embedded within ecosystems, the eco-agri-food sector creates a strong dependency for access to raw materials, energy, land, water, and a stable climate. Biodiversity is also critical to the health and stability of natural capital, and to essential flows of ecosystem services for the eco-agri-food sector, as it underlies resilience to floods and droughts, provides pollination services, and supports carbon and water cycles, as well as soil formation (Natural Capital Coalition 2016). Ecosystem services are critical not only to rural communities but also to urban and rural enterprise including tourism, infrastructure such as hydroelectric generation, water supply and irrigation, In particular, environmental degradation poses a direct and critical threat to the agribusiness sector: as much as US$ 11.2 trillion in agricultural assets could be lost annually as a consequence of environmental risks including climate change and water scarcity (Caldecott *et al.* 2013). Conversely, well-managed natural capital can provide positive opportunities. The Business and Sustainable Development Commission sets the economic value of a transformation to sustainability of the global food and agriculture system at “more than US$2 trillion by 2030” (BSDC 2017).

The information and knowledge provided by researchers, academics, NGOs and others provides an evidence base for the consequences of natural and social impacts and dependencies on agri-food businesses. Such evidence is driving change among many key actors: businesses are realizing that the availability and quality of natural capital can impact the demand for and cost of raw materials, energy and water; businesses are also realizing that their natural capital impacts and consequences on society can affect their license to operate, staff retention rates, etc.; governments are reinforcing legal frameworks for natural resource and social protection, consumers are increasingly demanding more social and environmentally respectful products, finance institutions are integrating environmental, social and governance criteria in their investment decisions and assessing climate and water risks on their practices. It is time for agri-food businesses to foresee and to manage the potential risks and opportunities. The internationalisation process

7 The Natural Capital Finance Alliance has developed two tools for water risk assessment: i) Drought Stress Testing Tool for Banks that helps banks understanding risk of loan default driven by droughts and ii) Corporate Bond Water Credit Risk Assessment Tool, which provides investors with a systematic and practical approach to assess water risk in corporate bonds and benchmark companies against sector peers.

8 The Finance Sector Supplement to the Natural Capital Protocol is developed by a consortium composed of the Natural Capital Coalition, the Natural Capital Finance Alliance and the Dutch Association for Sustainable Investment (VBDO).

has increased competition in global markets and some farmers and agribusinesses are already integrating natural capital into their decision-making. Other companies will need to properly manage their natural and social capital risks and seize their opportunities to be able to succeed in the long term.

Up to 2030, the global agenda is going to be driven by the Sustainable Development Goals (SDGs) adopted in September 2015. Business has a significant role to play in achieving these Goals. The SDGs articulate how business and economic success depend on, and are innately connected to, social and environmental success. Businesses need to use a structured approach to measuring their contribution to the SDGs, by understanding and assessing how dependent they are on capitals (natural and social); and what impacts they are having on them. These two questions will have to be faced by all stakeholders (governments, businesses, associations and individuals) and not only in relation to natural capital but also to social and other types of capital, as the SDGs are indivisible. The capitals approach, and the Natural Capital Protocol, not only allow organizations to ask themselves these questions, but provide a pathway to the answers by supplying a standardized framework to identify, measure and value impacts and dependencies on the capitals, bringing them into the decision-making process, and working with other actors to deliver on the SDGs.

In the remainder of this section, actions proposed by the Natural Capital Coalition for companies are described in terms of their operational, legal, financial and reputational liabilities, as well supply chain traceability, integrated landscape management and agroecological zoning.

Publication of a Food and Beverage Sector Guide has assisted implementation of the Natural Capital Protocol by providing additional guidance and sector-specific business insights, including: context on why natural capital is relevant to businesses and how they benefit from it; the business case for natural capital assessments; identification of natural capital impacts and dependencies relevant to the sector; and practical sector-specific business applications of the Protocol framework.

Some concrete examples in the Guide include: significant cost increases to protect fast moving consumer goods companies from increases in food prices; dramatic water costs increase (300 per cent) for food manufacturers in countries under water scarcity; and drops in share prices of companies due to key raw materials price rises. On the other hand, other cases show existing opportunities such as the growing organic food market or savings from adoption of circular economy and renewable energy approaches in food processing.

The Food and Beverage Sector Guide shows the business implications of different risks and opportunities experienced by the sector. These risks and opportunities are described below while some real-world examples are shown in **Table 9.1**:

- **Operational:** when the availability and quality of natural capital can impact the demand for or cost of raw materials, energy and water.
- **Legal and regulatory:** regulation and legal action can restrict access to resources, increase costs, and influence options to build or expand.
- **Financial:** Financial institutions are increasingly introducing sustainability criteria to inform decision-making and driving value.
- **Reputational and marketing:** Changing consumer preferences can influence sales and market share.
- **Societal:** Relationships with the wider community may be positively or negatively influenced due to activities impacting local natural resources.

Table 9.1 Real-world examples of well managed natural capital risks and opportunities reflecting distinct stages in the value chain

Risk and opportunities category	Stage of the value chain	Example of natural capital risk and opportunities managed
Operational	Agribusiness	As response to a 15 per cent almond yield reduction in California, Olam developed a drought response action plan to explore alternative practices. By broadening its outlook on soil dynamics (enhancing water holding capacity and soil nutrition), Olam thus reduced its dependency on an ever more pressured water resource (Cranston *et al.* 2015). The apparel company Kering is developing Environmental Profit and Loss accounts to identify key natural risks and opportunities and provide them with trustworthy information for decision-making. Based on their accounts, Kering decided, for example, to replace conventional cotton supplies by organic cotton when they realized that water consumption for organic cotton is three times lower than that required by conventional practices.[9]
Legal and regulatory	Agribusiness	The EU agro-environmental measures adopted under the Common Agriculture Policy (CAP); ecological-economic zoning (see **Box 5** on sugarcane in Brazil) and credit earmarking for sustainable practices create opportunities for innovative enterprises. Water scarcity, exacerbated by climate change, could cost some regions up to 6 per cent of their GDP in the future. When governments respond to water shortages by boosting efficiency and allocating even 25 per cent of water to more highly-valued uses, such as more efficient agricultural practices, losses decline dramatically and for some regions may even vanish (World Bank 2016).
Financial	Agribusiness	Several agribusiness projects acceded to IFC green bonds (IFC 2016).
	Food and beverage industry	YES Bank assessed the impacts and dependencies of the food and beverage sector through a case study, showing that the real value of water is 18 times the current industrial water rate in an Indian province (Dangi and Shejwal 2017).
Reputational and marketing	Agribusiness	Land area under organic agriculture worldwide tripled from 1999 to 2012 (FiBL 2014)
	Food and beverage industry	Eosta, an international SME distributor of fresh organic and fair-trade fruits and vegetables, developed an integrated profit and loss account to communicate their true value creation compared to a non-organic trading company (Eosta *et al.* 2017).
Societal	Agribusiness	A cooperative program among agricultural community and wildlife interests resulted in enhanced soil quality, increased biodiversity, and maintenance of valuable agriculture and waterfowl habitat in British Columbia (Canada) as the result of an initiative of Delta Farmland & Wildlife Trust (Zhang 2017). NESPRESSO sources 82 per cent of its coffee through the Nespresso AAA Sustainable Quality™ Program, which supports farmers in their efforts to achieve compliance with certification standards (Nespresso n.d.).

The Food and Beverage Sector Guide to the Natural Capital Protocol framework is intended to provide business with a better understanding of the changes in natural capital derived from their activities (not only their operations, but also upstream and/or downstream), and to estimate the value of those changes for the business and/or for the society. The framework provides agribusiness with a holistic view of natural capital, by understanding it as a system rather than focusing on independent aspects. The frame is intended to provide agribusiness companies with trustworthy and actionable information to support their decision-making processes. The Protocol and Sector Guides were piloted and tested by a group of companies, whose feedback contributed to enhance the applicability and usefulness of the framework. Within the pilot testers group, there was a good representation of companies from the agribusiness sector: 20 per cent of the fifty companies that participated in the pilot phase were directly connected with the agribusiness sector (including Olam, Nestle, Nespresso and Marks & Spencer, as described in **Table 9.1**).

Some of these large companies pioneering the integration of natural capital into decision-making are also influencing the whole sector through their supply chain, including small and medium agribusiness companies. This is the case of manufactures or retailers introducing sustainability requirements for purchasing products, for example the Unilever Sustainable Palm Sourcing Policy that sets a target of using 100 per cent of certified palm oil by 2019 (Unilever 2016). However, as discussed in Section 9.2 with reference to palm oil, certification has not always been successful in changing the status of an industry as a whole. Other instruments, such as agroecological zoning, may be more effective in combination with certification (see **Box 9.5**).

Companies do not only need to integrate natural capital but also social and human capital into their decision-making, for instance, by looking at the benefits of investing in women's empowerment across value chains (Jenkins *et al.* 2013; BSR *et al.* 2016). The Food and Beverage Sector Guide provides a frame for natural capital assessment. The TEEBAgriFood Framework expands this scope by providing a comprehensive frame to integrate all capitals: economic, environmental, social and human capitals, all of which must be measured and valued in order to properly assess the exposure of farmers and agribusiness to potential risks, as well as identify potential opportunities. Adopting practices that account for all such factors will increase sustainability of their business models in the long term. There is a perceptible increase in attention and proliferation of such collaborative initiatives for the business sector. Business-centred multi-stakeholder platforms form an integral part of TEEBAgriFood's proposed engagement strategies and will be discussed in greater depth in Chapter 10 of this report.

A further area for business engagement, Integrated Landscape Management (ILM), provides a growing role for business cooperation in assessment of external costs. Collaboration between ILM initiatives and agribusiness and food industry companies include corporate sustainability commitments and responses to growing local business risks of natural resource degradation, climate change and community relations in their operations and sourcing regions. Specific lines and cases of such experience of business engagement in ILM are explored in detail in Scherr *et al.* (2017).

The case of sugarcane zoning in São Paulo, Brazil, described in **Box 9.5**, represents one experience at a subnational level to conserve and restore critical land and water resources and avert health hazards. In this case, a coalition of agribusiness organizations, government and scientific research institutions has collaborated in assessing the risks of policy inaction and designing appropriate interventions. Nevertheless, it is important to avoid the tendency to focus on a single commodity, and adopt a multi-commodity approach within interventions targeting a specific landscape or region.

Box 9.5 Location of sugarcane processing units in Brazil (a) and agro-environmental zoning of sugarcane industry in São Paolo (b)

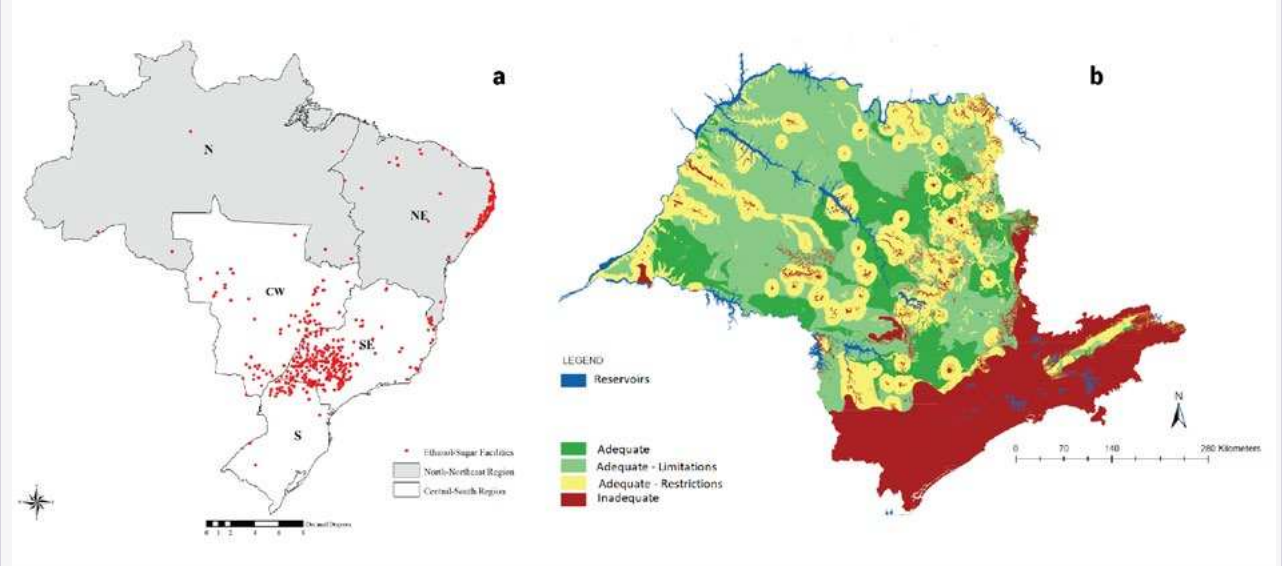
The growth in demand for both sugar and ethanol in recent years has resulted in expansion of sugarcane production and concerns expressed by both domestic and international actors regarding the negative impacts of land-use change (LUC) in Brazil, including greenhouse gas emissions, biodiversity loss, and impacts on food security.

The most extensive Brazilian sugarcane plantations are found in São Paulo, which produces nearly 60 per cent of total output. Government in the 2000s vigorously promoted Brazil's sugar-cane ethanol abroad as a clean fuel from a renewable source, able to deliver substantial GHG emission reductions by displacing fossil based fuels (UNICA n.d.; Wilkinson and Herrera 2008; WWF Brasil 2008; Egeskog *et al.* 2014). Occupying former pastures and some cropland, (Adami *et al.* 2012) sugarcane became a dominant element of the landscape (see **Figure 9.5**).

Use of sugarcane for both ethanol and sugar production complemented and fortified the agro-industrial complex. The domestic market for gasohol and ethanol-fuelled vehicles expanded rapidly in the 1970s under federal incentives, and was later driven by the spectacular growth in flex-fuelled vehicles. Investments directed at the Brazilian sugarcane sector grew rapidly.

Inhumane working conditions have long been associated with sugarcane cutting (Wilkinson and Herrera 2008; Repórter Brasil 2009) – as well as concerns related to deforestation. Impacts caused by sugarcane plantations include deleterious effects on water resources, biodiversity, soil, air quality and socio-economic conditions. Impacts of land use change include water pollution, soil degradation, application of pesticides and fertilizers, pressures on other crops and native forestland, as well as GHG emissions and particulate matter pollution from sugarcane burning (Coelho *et al.* 2007; Coelho *et al.* 2011; Goldemberg *et al.* 2008; Martinelli and Filoso 2008; WWF Brasil 2008).

Figure 9.5 Location of sugarcane processing units in Brazil (a) and agro-environmental zoning of sugarcane industry in São Paolo (b) (Source: SMA 2009; Walter *et al.* 2014)



Environmental quality impacts led to the negotiation among stakeholders to adopt policies that go beyond that mandated by national law, seeking to limit sugarcane expansion to areas whose resilience to such conversion is greater, and to work along the entire sugarcane value chain toward an integrated production system (Nassar *et al.* 2008; Nassar *et al.* 2011). The adoption of a sugarcane zoning protocol addressed diverse concerns.

In the late 2000s, the state of São Paulo undertook a strategic environmental project called "Green Ethanol" in partnership between the state secretariats of environment and agriculture and the Brazilian Sugarcane Industry Association (UNICA), resulting in the creation of an Agro-environmental Protocol and Agro-environmental Zoning Plan (SMA 2009). This initiative, based on an understanding between government, sugar mills and suppliers, sought to organize sugarcane-based agro-industrial activity to promote environmental compliance and minimize impacts.

The Agro-environmental Protocol was published in 2007, as a morally binding voluntary commitment (see further discussion on "pledge and review" processes in Ch. 10). The Protocol covers the following measures for impact reduction in sugarcane plantation: i) anticipate legal deadlines for phasing out sugarcane burning, prior to harvesting, ii) protect and recover riparian forests and springs on sugarcane farms, iii) reduce water consumption, iv) establish proper management of agrochemicals and vi) encourage air pollution and solid waste reduction in industrial processes. Despite the high investment costs conveyed by the Protocol's requirements, significant gains in productivity are predicted (Coelho *et al.* 2011). Adoption of these practices is promoted as an investment with a positive return due to improved terms of market access and risk protection (TNC n.d.). As a result of the adoption of such measures, production plants receive a "Green Ethanol Certificate" of compliance (UNICA 2010; Coelho *et al.* 2011; Imaflora 2015).

The Green Ethanol program also introduced Agro-Environmental Zoning (ZAA), launched in 2008. The ZAA was designed to direct the expansion of sugarcane into new production areas, identifying restrictions for production, including protected areas and biodiversity conservation concerns, soil and climate aptitude, air quality, water availability and topography (SMA 2009). This exercise culminated in the publication of a zoning map, which categorizes land suitability for sugarcane cultivation and for establishment of agro-industrial facilities (**Figure 9.5b**). Although these regulations do not empower authorities to deny activities non-compliant with the zoning map, public development banks, international agencies and external investors may condition finance on meeting zoning criteria (see Section 9.4.5).

Barriers to successful application of the protocol include the employment of new equipment and coping with labour dislocation due to mechanization, while demand is unfulfilled for more skilled workers. Proper monitoring and inspection of policies and instruments and their effectiveness in protecting against impacts on labour and fragile biota are needed. A full valuation of the externalities associated with sugarcane expansion highlighting their various hidden costs would represent an important opportunity to bolster policy decisions. This would entail identifying the local as well as global benefits associated with adherence to the Green Protocol and zoning, while reinforcing its effectiveness through dissemination to stakeholders of the sucra-alcohol complex beyond São Paulo where sugarcane cultivation is undergoing rapid expansion in the Center-West region of Brazil.

9.4.7 Instruments to guide farmers' practices

Innovations are adopted depending on a "recipient" agent's propensity to adopt or to resist technical change (Rogers 1995). Early adopters lead by example, encouraging others to take up innovations or be expelled from the market due to inability to adopt before being "creatively destroyed" (Schumpeter 1974). In our view, however, the "laggards" (who exhibit strategies of risk aversion and precaution), rather than being a drag on the system, are in fact those who TEEBAgriFood should seek out in order to protect them from the effects of conventional agri-food innovations, including the damages these forces can bring to the environment, human health and welfare of rural communities.

A more effective and inclusive approach to innovation would rely on a bottom-up approach to technology development and improvement, starting with farmers' own natural propensity to experiment and learn how to adapt tools and germplasm to their specific context. Upstream scientists who experiment with controlled variables primarily on research stations, usually with a focus on marginal lands and limited resource farm communities, have struggled to integrate such ideas into mainstream agricultural research procedures. This began with the Farming Systems Research (FSR) strategies of the 1980s, which were a reaction to Green Revolution failures to adequately address issues related to rain-fed, upland or dryland hardscrabble dirt farmers.

FSR involves participatory diagnosis with farmers, looking at their cultivation, livestock integration and intercropping or agroforestry systems. The next steps are on-farm trials of incremental modifications in the hope of reducing limitations to resilience and stabilizing the use of existing resources (Collinson 2000). Though FSR had some notable successes, it was outmanoeuvred by the strong economic interests that benefit from the current system (chemical, seed, tractor companies, etc.) and which have access to government through their respective lobbies; there are few comparable dedicated groups with strong enough economic interests to maintain support for FSR. There remains, in consequence, very little international or domestic investment in FSR or alternative production systems such as organic, agroecological, agroforestry, etc. relative to conventional systems.

Despite the failure of FSR and similar approaches, one of the notable recent CGIAR (formerly the Consultative Group for International Agricultural Research) ventures into this terrain is AR4D (Agricultural Research for Development) whose notable work on a multitude of sub-programs within the scope of the CCAFS (CGIAR Program on Climate Change, Agriculture and Food Security) adopts a Theory

of Change perspective akin to that of TEEBAgriFood as a starting point (Thornton *et al.* 2017):

> *CCAFS's approach to theory of change is centred on adaptive management, regular communications between program and projects, and facilitated learning within and between projects…. Many project participants and partners were willing to take on the challenge to develop new ways of collaborating and working beyond delivering outputs. After one year of the pilot phase, several projects had made considerable progress, although making fundamental shifts in the way of working takes time and (initially at least) additional resources, as well as iteration and learning. It also may affect team composition. Some projects recognised that additional skills beyond disciplinary expertise would be required, such as skills in coordination, facilitation, engagement, communications, and participatory learning-oriented monitoring and evaluation. Stakeholder buy-in and a supportive organisational environment were also seen by most projects as necessary elements in implementing the approach.* (Thornton *et al.* 2017, p.148)

This polycentric, multi-stakeholder approach that takes into account shared learning as a basis for attaining results has much in common with the TEEBAgriFood Theory of Change.

To incentivize the adoption of best practices by farmers, PES schemes (payment for ecosystem services) have begun making the link between downstream users and upstream producers, particularly for water quality and flow regulation. For example, in Mexico, Ecuador and Costa Rica, national programs for PES have been underway for over a decade. Although hotly debated in the literature with respect to their effectiveness and equitable distribution of benefits (Muradian *et al.* 2013), there is no question that the appeal is greater for rewarding those who do good for the environment than fining farmers for doing the wrong thing. Numerous PES models have been developed that accelerate conversion to good management practices and natural area management, at relatively low cost. The major challenge is organization, and mobilizing finance for farm/landscape investment before ecosystem service flows are realized. A decisive role for TEEBAgriFood assessment in this respect would be to furnish information that would support effective early targeting of compensatory payments to farmers who agree voluntarily to participate in PES programs.

As indicated earlier in this section, fair trade practices and certification in some commodity areas have brought some improvement in the share of value added that accrues to farmers. It is nevertheless true that the lion's share of the benefits from the rising consumer concern for food quality and origin falls to intermediaries and retailers. TEEBAgriFood can provide tools to help family farmers and smaller actors better negotiate such arrangements. One way to do this is to influence procurement policies for institutional food provision by government, business and schools. In Brazil, for example, agreements between local governments and farmers subsidized by federal price supports stipulates that ingredients for school lunches be provided through specific arrangements and a goal that 30 per cent of all such supplies be provided from local sources.

Finally, levers are needed to motivate large farmers in industrialized countries to adhere to sustainable production standards, a significant challenge. Policy signals are gradually leading large-scale food producers and processors to respond to health concerns. To supply the growing demand for organic, locally sourced or fair-trade foods, such goods must now be grown at a larger scale. Yet the market for organic food in the US was still only 5 per cent of all home-consumed foods in 2015, though this share had doubled since 2005 (Greene *et al.* 2017). And certainly, the broader market is also reflecting concerns of society, as discussed below.

In countries where large-scale commercial agriculture has been a source of environmental problems, confrontations have arisen between farmers/agribusiness and environmental organizations. Farmers often view environmental rules as a tool of social control by groups antagonistic to the difficulties they face. Finding more collaborative models that empower local actor groups to negotiate and devise solutions to achieve those goals may be much more effective than setting specific field or farm-level rules that do not fit the local context.

In developing countries there is still a widespread lack of support to enable transition at scale to more sustainable agricultural systems. In many countries conventional agricultural supporters point to a track record of how increased fertilizer supply benefits yield and offer advice on how to effectively distribute fertilizer to the field; such a solution is not in place for inputs or products of alternative farming systems. The metrics to illustrate the costs and benefits of proposed improvements in value chains in this context are elusive.

9.4.8 Tools to change consumer behaviour

Consumer concerns are proximate, myopic and personal; the material effects of food on one's health, satisfaction, and wallet are major immediate influences. Information on packaging and the sensitivity toward medical suggestion are important sources of influence to drive change in consumer behaviour. Recent surveys by Nielsen (2016) show that there has been a significant change in consumer attitudes toward the healthiness of foods available to them, which will undoubtedly shape

the direction of things to come in eco-agri-food systems. These include:

- More than one-third (36 per cent) of 30,000 global online survey respondents in 66 countries say they have an allergy or intolerance to one or more foods;
- Nearly two-thirds of global respondents (64 per cent) say they follow a diet that limits or prohibits consumption of some foods or ingredients (particularly in Africa/Middle East and Asia) – nearly half of these do not feel they are being adequately served by food available to them;
- More than half of consumers say they're avoiding artificial ingredients, hormones or antibiotics, genetically modified organisms (GMOs) and bisphenol A (BPA).

Unfortunately, there is a class divide in food awareness that limits the breadth of these more positive impacts of consumer concern. Healthy attributes are credence goods, that is, their purported qualities cannot be easily verified directly by consumers (at least not immediately on purchase or consumption). Consequently, the process of consumer decision-making is largely influenced by the level and quality of information she possesses, and which is supplied by the market. Manipulation of such information to provide a healthy image to consumers is common. To build a stronger consumer awareness of the characteristics and quality of foods, to enable more discriminatory choices is thus a major priority to promote change in the eco-agri-food system. This is an even greater challenge when the most precarious dietary conditions are found among the poor, who – even in the richest countries – are more susceptible to nutrition-related maladies such as obesity and diabetes.

Communication strategies that engage a wider audience on food and health and show linkages to social and environmental issues are a tool for informing and influencing consumer behaviour. In Chapter 10, a proposal for a "Food Atlas" is made that would lay out the impacts of food and food production as they relate to the different capitals that are part of the eco-agri-food system in easily comprehensible terms. More broadly, as highlighted in Chapter 8, consumers can use the TEEBAgriFood Framework to better understand the constitution of sustainable diets, as well as the health implications of their current food consumption patterns, and the size of their current food footprints.

This all leads back to the discussion in Section 9.2.1 above regarding the credibility and legitimacy of information as a basis for change in practice. From a behavioural psychology perspective, at an individual or collective level, a person or group's world view and political perspective are often more important in determining openness to change than whether the information she receives is adequately convincing (Weber and Johnson 2009).

The intensive public relations campaigns led by major food and agricultural input companies have included support for policy dialogues, major media coverage of food issues and intensive lobbying of international aid organizations. The aim of this media and networking blitz has often been to position large-scale agroindustry's high-external input systems as the "only" way to reliably produce large volumes of food, and as champions of sustainability. These campaigns often mislead consumers, and are difficult to combat. A cacophony of narratives only serves to confuse the issues at stake.

Nevertheless, there is no question that the food industry has been going through a significant transformation over the past decade due in large measure to consumers' concern over their health and that of the environment from which food is sourced. The food localization movement has combined with concern for excessive reliance on long distance transport and trade for foodstuffs, whose freshness is questioned. Buying fresh food locally becomes a way for individuals to make a positive statement to their peers regarding their contribution to mitigating climate change, as well as to shore-up endangered family farmers and to protect prime agricultural lands near major urban centres.

To stimulate greater knowledge of externalities in the food system throughout society, alliances should be formed with non-farm communities whose interests in food quality and identity they share. Programs such as community-supported agriculture, direct marketing, recreational exchanges on farms and cities, cross-site visits, farms in community and state park systems, etc. have blossomed, and will serve an important purpose to build support for change in agricultural production practices and food quality along the value chain.

9.5 THEORY OF CHANGE AND ACTOR-RELEVANT STRATEGIES TO DESIGN INTERVENTIONS BASED ON TEEBAGRIFOOD

The previous sections of this chapter, by describing various contexts in which eco-agri-food policies are debated and negotiated, provide an overview of how different actors are involved in such processes. This final section proposes a synthetic view of the theory of change described throughout this chapter, and illustrates the consequences of this theory of change

for the design and intervention strategies of future TEEBAgriFood studies.

9.5.1 Prioritizing actors as points of entry for change

Analytically, actors mentioned above are of two types: the first are key players in a given food system whose actions are driving – or constraining – the system. These actors' behaviour and choices need to change if the food system is to evolve in sustainable ways. The second are actors desiring to bring a change in food systems by making use of TEEBAgriFood resources, thus collaborating with actors of type 1 to disseminate knowledge of the true costs inherent in the food system. Since it was shown above that information in itself may be insufficient to provoke a change, it will need to be mobilized by such actors (Majone 1989; Fisher and Forester 1993; Laurans *et al.* 2013; Mermet *et al.* 2014; Feger and Mermet 2017).

Another important analytical category introduced in the chapter is the notion of driver of change. For each actor group, there is a set of levers that determine the actor's behaviour and on which the agents of change can exert influence. Governments, or more specifically ministries, can make use of TEEBAgriFood results to frame negotiations with agribusiness regarding its agri-food policies. But there are also cases where a government (and even sometimes the very same government) will be a key actor that Civil Society Organisations (CSOs) will pressure, based on TEEBAgriFood results, to induce changes in legislation that will drive change in one or more nodes of the food system. Such aspects should be conceived in dynamic terms: actors and influencers can coexist in the same organisation and are competing to drive their organisation in a certain direction in a cascade of influence. For instance, a social movement may use a study to make a government undertake a change; the government will in turn use the study as well to make other actors change and so on. To illustrate this, actors are grouped in **Figure 9.6** below with a proposed relative position on the continuum axis between the influencer pole and the key actors pole.

These actors together participate to drive the agriculture-health-environment nexus, with different roles. For each type/subgroup of actors, levers and drivers of change are suggested, as well as indications on how TEEB outputs can be made relevant to these actors and levers in **Table 9.2**.

Figure 9.6 Agri-food actor group continuum (Source: authors)

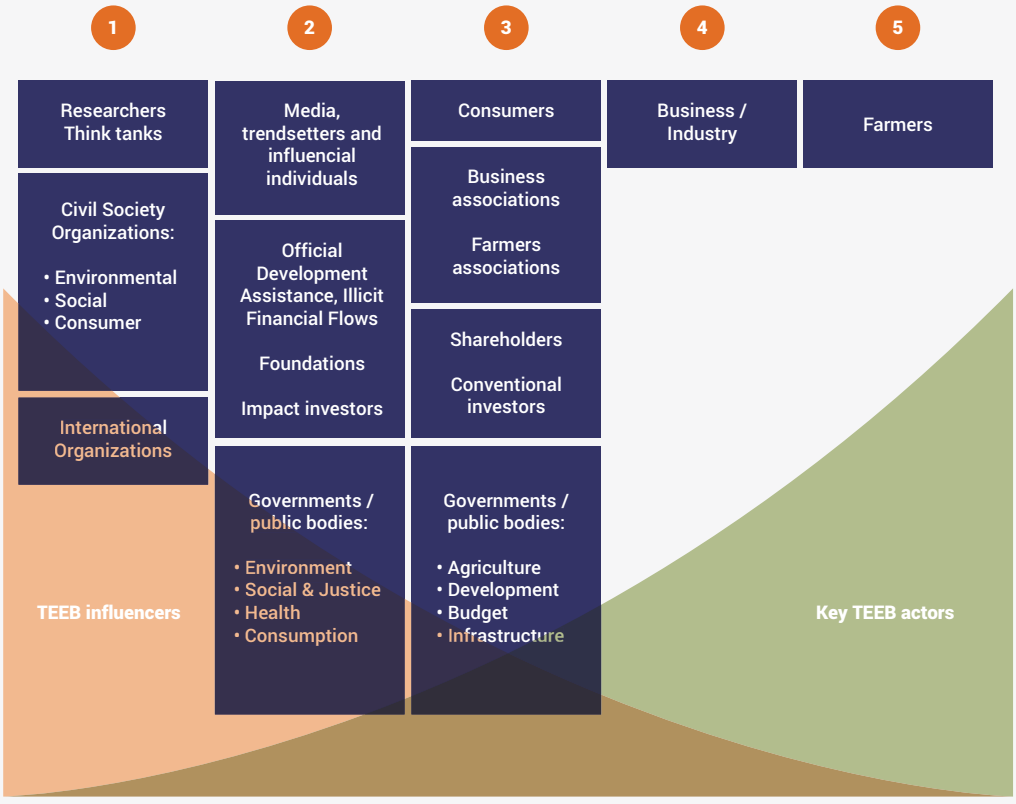


Table 9.2 Actors groups, typical levers and drivers of change and according relevant TEEB inputs (Source: authors)

Actor group (Figure 9.5)	Actor (Figure 9.5)	Lever / driver of change	Relevant TEEB input and how TEEB results could be translated
1	**Researchers and Think tanks**	Attention and support to research	Research avenues, blind spots to be addressed, policy-relevant pending questions
	CSOs	Availability of arguments Opinion awareness	Environmental, social and consumption consequences of unsustainable agriculture ((including environmental accounting such as Natural Capital accounts…)
	International Organizations	Governmental sensitivity Opinion awareness Policy perspectives Institutional	Social consequences of unsustainable agriculture
2	**Media, trendsetters and influential individuals**	Awareness of and sensitivity to impacts on well-being and immediate future Knowledge of opportunities and concrete solutions	Storytelling / success stories: Major, global as well as local concerns, and how they are addressed by innovative local and concrete solutions
	Overseas Development Agencies (ODA), International Funds, Foundations, Impact Investors	Profitability and sustainability indicators	Impacts of unsustainable agriculture on social and economic profitability Sustainable development Impact investments opportunities
	Governments: public bodies dealing with environment, health, consumption, social aspects and justice	Availability of: Norms, impact indicators (pollution / health thresholds) Feedback on policy implementation and best practices Policy perspectives (typical implementation pathways, w.r.t. taxes, subsidies, regulation) Opinion awareness and political support Reputation Accountability and cost-benefit ratios	Evidence on environmental, health and social impacts of unsustainable agriculture, for various geographical, social and economic contexts Illustrations / examples of best practices and of policy instruments and implementation Inclusion of governmental initiatives in inputs for media and trendsetters Indications on national and international commitments Policy evaluation indicators

3	**Consumers**	Change of social norms (esp. with respect to diet shift) Practical solutions for diet change Education and school kitchens Information on benefits from healthy and sustainable food Certificates and labels	Illustrations and Story-telling on relations between (un) sustainable agriculture and (un) healthy food, (un)healthy environment, … Practical examples / best practices of food system adaptation Practical recommendations Certification evaluation and mapping, indicators of informed consumer choice, information sources
	Business associations	Profitability and sustainability indicators Public support and guarantees with respect to long-term policy orientations Consumer awareness and political sensitivity Perspectives on future mainstream and alternative business models Clarity and stability of sustainability requirements	Evidence with respect to profitability (see also ODA…) Information on long term policy trends (past and future) Illustration of profitable sustainable business models Orientations for designing sustainability requirements in typical agro-food products
	Farmers associations	Indications on sustainable income, labour conditions, economic perspectives Others equivalent to Business associations	Illustration of impacts of sustainable agriculture on farmers social and economic condition (income, labour conditions and health) Training and education materials
	Shareholders and (conventional) investors	Profitability and sustainability indicators Long term economic perspectives Reputation of industry and businesses	See “business associations”
	Governments: public bodies dealing with agriculture, development policies, budget, infrastructure and utilities…	Collective profitability Cost-effectiveness ratios Reputation Long term perspectives, Demand and use	Cost-effectiveness of sustainable agriculture solutions Examples / illustrations of reputational risks Demand and use forecasts and scenarios
4	**Business / Industry**	See “business associations”	Case studies Illustrations Best-practice guidance, applying TEEB for business / Natural Capital Coalition’s Natural Capital Protocol Business policy evaluation scorecards
5	**Farmers**	See “farmers associations”	Storytelling related to land tenure, investment profitability, market trends, income Illustration of improved profitability (reduced costs / improved access to market) from sustainable agriculture + identical to “media…” and to Business / industry

From this analysis stems an important conclusion for the ToC of TEEBAgriFood studies. To foster change in food systems, any study needs, during its design phase, to identify which potential influencers, in which typical contexts, it wishes to equip, in order to activate which lever on which actor group. Outreach strategies must be geared towards potential users, or even directly communicated towards certain actor levers.

9.5.2 Developing strategies to design and disseminate actor-relevant TEEBAgriFood studies

To respond to these challenges and to integrate the elements above, actors willing to make use of TEEB results to bring a change in the eco-agri-food system should adopt a three-tier approach to study design and strategy. The elements of this approach, listed below, concern different stages in the production process of a study based on the TEEBAgriFood Framework, but should also be seen as interacting with each other and partly overlapping in time.

- **Phase 1. Design a study and plan for intervention: context assessment and strategic framing.** As for any assessment and evaluation study that aims to deliver a message and eventually produce a change in society, TEEBAgriFood authors should understand the strategic context in which their study will intervene (Mermet 2011; Coreau 2017). What efforts have already been made to put key questions on the agenda and tackle them (e.g. environmentally harmful subsidies), by whom, with what effect? Did opposing actors enter into confrontation over these efforts, and if yes, how did they react to this newly provided information, and with what effects? How were coalitions on each side structured? Do they still exist today? These types of questions should enable author teams to identify the users and targets discussed above. Then, author teams should engage with different users to better integrate their own experience of the issues at stake (Turnhout *et al.* 2012) and co-construct parts of the study with them, to maximize the chances that the study has impact once released.

- **Phase 2. Conduct strategic outreach and intervention.** Once the study is produced, and even better while it is being produced, an intervention strategy should be designed. For the global scope results, for instance, the intervention strategy could be adapted to different national contexts and their own most salient issues at the agriculture-biodiversity nexus. Indeed, at a given point in time, national and regional arenas are agitated by different debates, and these debates frame how governments, media and the general opinion view different types of information on agriculture and biodiversity issues. If controversy is roaring in a given country on, for instance, pesticides, agricultural reform, or deforestation, the use of new results and messages will resonate stronger if some parts of the messages are highlighted to specifically contribute to these debates. This "strategic packaging" (Waite *et al.* 2015) of results consists of choosing which messages could be highlighted, in national press releases for instance, to better serve potential TEEB users in their quest for change. Beyond the media, specific discussions could be organized with potential users, and the TEEB team could guide them through the report to help identify the elements that could be of most efficient use in their own advocacy strategies, for instance to highlight aspects that had been previously put aside in debates. The discussions held in Phase 1 obviously constitute preparatory work for Phase 2.

- **Phase 3. Monitor and respond.** After results and messages are conveyed, monitoring activity will be useful: any given study only adds its voice in a concert of other flowing information, and to have impact it must be acted upon (Latour 2005). In the case of TEEB, this monitoring could focus on identifying: i) the positive impacts of the TEEB study, to foster reflexive learning for TEEB, and ii) how different biodiversity-agriculture debates evolve and how the study could be mobilized, even some years after publication. This could also include a monitoring of evidence for strategic ignorance of TEEB and TEEB-like results (see Section 2.1). This monitoring could then help build a response to this evolving context: issue a new press release targeted towards an emerging debate and to which previous TEEB results could contribute, or work with TEEB users to see how different actors could mobilize to try and combat detected ignorance mechanisms.

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(Footnotes)

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