

## 2. Adapting agriculture to a changing climate: a social justice perspective

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### Abstract

We are already past the point where climate change mitigation alone does not suffice and major efforts need to be undertaken to adapt agriculture to climate change. As this situation was both foreseeable and avoidable, it is urgent to see that particularly people who have historically contributed the least to climate change do not end up assuming most of the costs. Climate change will have the worst effects on agriculture in the tropical region in the form of droughts, extreme heat waves and massive storms. The historical unequal contributions to climate change and its unjustly distributed consequences morally oblige us to distribute global adaptation costs fairly. Yet to have a full understanding of the social implications of adapting to climate change we need to look beyond making adaptation technologies accessible and available. Using a social justice framework, I defend fair prices of adaptation technologies as a demand of justice in exchange, an allocation of research attention proportional to urgent global needs as distributive justice, inclusive technology development and governance as contributive justice and addressing the interests of future generations as intergenerational justice.

**Keywords:** climate change, farm management, sustainable stewardship, responsible innovation

### Introduction

We are past the point where mitigation efforts alone will suffice to confront climate change – major efforts to adapt agriculture to the new climatic conditions are unavoidable. Yet climate change adaptation does not have to, nor should, be devoid of efforts to mitigate climate change (Nightingale *et al.*, 2020). Depending on the agricultural pathway we choose to follow, food production systems can be a major capturer of atmospheric carbon, both above and below ground (Koohafkan *et al.*, 2012). To influence the decision on which food future we ought to follow, an important step is to identify the different ethical reasons to justify such a transition. Such an approach needs to acknowledge that agriculture is not only about increasing food supply. Working the land has a deep impact on the environment and involves multiple issues for social justice (Noll, 2018; Thompson, 2017). It is also a form of cultural expression, a way of life and a form to relate to nature (Berry, 1977, 2015).

### Inequalities and climate change

In the media we can find particularly striking images of rising sea levels, wildfires due to long droughts, record breaking hurricanes and tropical cyclones, and humans and animals suffering from extreme heat waves. These images coming from all over the world make clear that climate change is a global threat. Yet climate change is far from being a great equalizer – rather the opposite is true. Particularly in agriculture we can observe that climate change increases inequalities at multiple levels:

- *Global inequalities.* The tropical regions of the world, which are also the areas with the highest rate of hunger and malnutrition, need to make the strongest efforts to adapt agriculture to higher temperatures, erratic precipitation and stronger storms (McMichael, 2017). Adaptation involves massive investments in irrigation and the adoption of new crop varieties. This is also the region with

historically the lowest contribution to climate change. In addition, arable land becomes increasingly scarce for the local population, due to direct effects of climate change, such as desertification and salinisation, and indirect effects, such as land grabbing to cultivate crops for biofuels and land use changes destined to off-set emissions from high-income countries and conservation efforts (Corson and MacDonald, 2012).

- *Local inequalities.* As case studies in the Caribbean show, lower precipitation induces poorer farmers with no irrigation systems to concentrate their cultivation in a shorter period of the year and to avoid water-intensive crops (Popke *et al.*, 2016). As a consequence, poorer farmers harvest similar crops at the same time, leading to a short-term oversupply that drastically reduces their market value and to food waste. Richer farmers who usually count with irrigation systems can avoid cultivating crops during times when these will end up in oversupply and can risk planting water-intensive crops (*idem.*). As a result, richer farmers will obtain higher premiums for their crops, and will thereafter likely be able to buy land and labour from distressed farmers, exacerbating inequalities.
- *Gender inequalities.* Women play the central role in *in situ* agrobiodiversity conservation and development (Glazebrook *et al.*, 2020). Seed exchange networks empower women. When agricultural development mandates impose commercial seed varieties, especially women lose important cultural, social and knowledge exchange networks, and become more dependent on external factors. Hunger is also a major threat for subsistence farmers and here women and girls are particularly vulnerable (Shiva, 2009).

Countries and communities who have historically contributed the least to climate change should not end up assuming most of the costs and should have more options than buying at high prices from countries with a high emission history the technologies they need to adapt to the new climatic conditions (Biddle, 2016). Both the unequal historical contribution to greenhouse gasses emissions and the unevenly distributed consequences of climate change morally oblige us to distribute the global costs of confronting climate change fairly. However, revising agricultural practices to respond to climate change involves much more than distributing costs.

## **A social justice framework**

Innovation is generally seen as the answer to maintain food production capabilities. To provide a different lens to identify how innovation affects society I have developed a framework built on six dimensions of social justice (Timmermann, 2020). This framework includes four forms of justice:

- *Justice in transaction.* Exchanges need to be free from deceit, avoid harmful relations of dependency, not lead to harm and be based on fair prices.
- *Distributive justice.* There needs to be a fair distribution of research attention that corresponds to the urgency of the social and environmental problems.
- *Contributive justice.* Participation is intrinsically valuable and a prerequisite for good science and governance. Capacity-building is needed to facilitate meaningful participation. Innovation systems need to be inclusive and systematically incorporate local knowledge.
- *Intergenerational justice.* The interests of future generations need to be considered, particularly in relation to efficient resource use, maintaining biodiversity and avoiding relationships of unilateral dependency.

And two processes to establish justice before and after the innovation processes and their diffusion:

- *Procedural justice.* The innovation processes need to respect codes of good scientific practice and principles of access and benefit sharing. There needs to be a democratization of research agendas.
- *Restorative justice.* Reconciliatory processes need to take place to do justice to those intentionally or accidentally wronged or disproportionately disadvantaged by innovation processes and diffusion.

## Technological futures

To visualize the potential of this framework I introduce three technological futures. These categories are highly simplified for illustration purposes:

- *Conventional approach*: One option is to continue with business as usual, relying on high external inputs and progressive adapting agriculture as yields fall and harvests fail. Climate change is seen as a reality, but agriculture is not given any special role in mitigation. Increasing yields is seen as a goal as it also allows to give back land to nature and thus store carbon and harbour biodiversity (Springmann *et al.*, 2018).
- *Agroecology*: Climate change can be an opportunity to transform the food system into a more sustainable and just system (Koohafkan *et al.*, 2012). By using farmers' traditional ecological knowledge together with principles identified in agroecological studies, farms can be designed to benefit from ecological synergies to produce food. Ideally farmland should be both a nature reservoir and a food system. This allows it to have richer soils and maintain larger biomass capturing additional carbon.
- *Emergency synthesis*: Recognizing climate change as an emergency dictates the use of whatever means achieves the fastest reduction of emissions. The rationale is that climate change will cause such disastrous outcomes that we need to sink emissions without much regard to other near-term social justice issues. A strong position would prohibit certain types of land conversion, or even dictate rewilding, when areas have a strong potential for providing ecosystem services that capture carbon (Davidson, 2017).

## Justice considerations

A preliminary analysis would suggest the following considerations. From a 'justice in transaction' perspective, innovation needs to be acquired on a voluntary basis and be free from deceit (cf. Walton, 2014). Prices need to be fair for both innovators and users. The acquisition of externally produced inputs would have to come to some advantage to the users to compensate for any disadvantages of not being able to use previously internally produced inputs. This of course does not exclude that a well-informed farmer may also voluntarily purchase a climate-friendly innovation to reduce emissions. As climate-friendly technologies produce a series of public goods, subventions benefiting users and innovators are compatible or even demanded by principles of justice, particularly for sectors that already have done their share in reducing emissions.

'Distributive justice' would need to consider global research needs. Strategies that are conducive to reducing the plight of the worst-off and at the same time contribute to climate change mitigation should receive the largest share in research attention. This offers a strong argument to rectify the weak funding agroecological studies receive (Tittonell, 2014). Yet considering the state of emergency, one could argue for some exceptions from such rule for innovations with a high potential in mitigating climate change, even when such technologies would give already well-off farmers an additional advantage.

Participation plays a fundamental role for 'contributive justice' and offers strong grounds to condemn innovation systems that are insufficiently inclusive. There are also epistemic grounds on why inclusiveness should be aimed at: local knowledge can help make innovation more sustainable and fill critical knowledge gaps (Ziegler and Ott, 2011). To benefit from inclusivity, biases and prejudices need to be confronted to create an environment that is receptive to new ideas without regarding where they come from. During an emergency we might be tempted to sacrifice inclusive technology development. Yet, particularly in relation to climate change, many innovations have failed to achieve their expected results and have even been sabotaged for not having fully considered important local factors (Bremer, 2017).

In terms of ‘intergenerational justice’, there is a strong argument in favour of addressing environmental sustainability by taking emergency measures to mitigate climate change. Future generations should be able to secure their basic needs. Yet intergenerational justice is not only worried about future food availability. We should avoid placing future generations in a position of unilateral dependency by completely outsourcing from farms the production of key inputs and thereby imperilling food sovereignty. Moreover, as we have been bequeathed agrobiodiversity as cultural heritage (Sievers-Glotzbach *et al.*, 2020), it is not up to one generation alone to decide to forfeit such millenary legacy to make up for decades of climate inaction. Similarly, being a farmer is also a way of relating to the land and the environment, which allows people to exercise certain values, such as care, empathy and reciprocity, and thereby maintain intrinsically valuable forms of relationships (cf. Jax *et al.*, 2018). Food futures that do not allow such relationships to the land come with major (agri)cultural losses.

To achieve these demands of justice, two additional processes need to be followed. As a matter of ‘procedural justice’, we should ask ourselves: how is the problem phrased? Is this phrasing supported by all stakeholders or is it a result of highly unequal power relations? For instance, the term climate change adaptation places responsibilities to individuals and communities instead of targeting causes (Ribot, 2011). Some farming systems can be given a lesser role depending on how their contribution is framed. Phrasing the question as ‘how can biotechnology best contribute’ and ‘how much can organic agriculture contribute’ already gives a farming system a higher role than the other (Tittonell, 2014).

To address issues of ‘restorative justice’, we need to identify those who disproportionately suffer from the chosen innovation strategies. A reconciliatory process should aim at recognizing their burden and improving their situation. Such processes are particularly important when dealing with an emergency situation that obliges to make major sacrifices. Even in emergencies technology needs to be critically assessed. The prioritization of one technological pathway needs to follow well-established criteria and be publicly justified. Climate change is not caused by a generation alone, but needs to be fixed by a single generation. This allows us to pass on some of the costs involved in preventing the catastrophic outcomes of continuous inaction.

## Conclusion

Up to what level we can justify emergency measures to confront climate change will ultimately depend on how seriously we take climate change as a threat. Erratic climatic conditions jeopardize food production and as food is a basic need, we could justify major short-term injustices in the innovation system to secure future food availability and thus liveability. Radical change that at the same time makes food systems fairer is still possible. Yet further delays in making the necessary arrangements for a major food transition will oblige us to make greater and greater sacrifices in justice in innovation. Even when making decisions in a state of emergency, we still have room to do our best to address as many dimensions of justice as possible.

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