

TEEB for Agriculture & Food Interim Report

EXECUTIVE SUMMARY

The Economics
of Ecosystems
& Biodiversity



A report by
'The Economics of Ecosystems & Biodiversity'

Agriculture at the centre of human wellbeing and sustainable development

1. Human history is inextricably tied to the development of agriculture. This tie has always been about more than agriculture as a source of food for human sustenance; agriculture has influenced our value systems, our cultural heritage, the structure and location of our communities, and the development of other sectors in the economy. Agriculture is central to our lives.

2. Human well-being is affected by these disparate ties. We need sufficient quantities of food with adequate nutritional value in order to survive – this is a fundamental physiological need, and this human need is still not being met for a significant portion of the world's poor, a central challenge reflected in several of the Sustainable Development Goals. However, all of the other ties also reflect elements of sustainability.

3. How we produce, distribute and consume food affects these ties and thus our well-being. Increasingly however, the ties between food systems and human health, cultural heritage, and the impacts that our production systems are having on nature have become largely invisible, or worse, severed completely.

4. This invisibility can move us away from stewardship of our natural resources, to their unsustainable use, generating negative impacts for both present and future generations.

Agricultural systems and the provision of food and nutrition

5. Food systems are producing more than enough calories to feed the world today. Since 1970, the amount of food available for every person for direct consumption has increased from 2370 to 2770 kcal/person/day. In aggregate, there is sufficient food available for everyone to be fed, and nearly everyone to be well-fed. That this is not happening points to systemic failure in equity and meeting basic human needs.

6. Indeed, owing to problems of access and distribution, some 2.3 billion people in developing countries consume under 2,500 kcal/day (500 million of whom consume less than 2,000 kcal/day), while 1.9 billion in developed countries are consuming more than 3,000 kcal/day. While many are dying of want and starvation, others suffer from lifestyle diseases stemming from over-consumption.

7. And this need not be so. Approximately one-third of the food produced in the world for human consumption every year — approximately 1.3 billion tonnes — gets lost or wasted. If food waste were a country, it would be the third largest emitter in the world in terms of greenhouse gas emissions (3.3 billion tonnes).

The role of women in the agricultural sector

8. On average, women comprise 43 per cent of the agricultural labour force in developing countries; this figure ranges from around 20 per cent in Latin America to 50 per cent in parts of Africa and Asia, and exceeds 60 per cent in certain countries. Although largely restricted to growing food crops and rearing poultry and livestock, women are responsible for 60 to 80 per cent of food production in developing countries.

9. However, women only represent between five and 30 per cent of all agricultural landholders in lower income regions.

10. If women had the same access to productive resources as men, FAO estimates that they could increase yields on their farms by 20 to 30 per cent, raising total agricultural output in developing countries by 2.5 to 4 per cent.

11. Closing the gender gap in terms of access to agricultural inputs alone could lift 100 to 150 million people out of hunger.

The positive impacts of agriculture on human livelihoods

12. As well as providing the food and sustenance we need, agriculture and food systems also create employment and income. The sector employs one in three people of the world's economically active labour force, or about 1.3 billion people.

13. An estimated 2.5 billion people are involved in full- or part-time smallholder agriculture, while over one billion people living in rural poverty are dependent on agriculture for their livelihoods. As such, agriculture is the socio-economic backbone of rural landscapes. Smallholder farms (i.e. less than 2 hectares) represent over 475 million of the world's 570 million farms and, in many low income countries, they produce over 80 per cent of the food consumed.

14. The agricultural sector does not produce only food - it also produces feed for animals (for human consumption), fuel (both traditional fuels and modern biofuels) and fibre for artisanal and industrial production. Thus the agricultural sector contributes inputs to many other industrial sectors.

15. The FAO estimates that about 500 million hectares around the world are dedicated to agricultural heritage systems that still maintain their unique traditions with a combination of social, cultural, ecological, and economic services that benefit humanity.

The impacts of our food consumption and production patterns on human health

16. Globally, an estimated two billion people are experiencing micronutrient malnutrition. By contrast, global levels of obesity have more than doubled since 1980. Recent estimates show that over 1.9 billion adults are overweight, 600 million of which are obese.

17. Vitamin A deficiency – the greatest preventable cause of needless childhood blindness and increased risk of premature childhood mortality from infectious diseases – still affects 250 million preschool children and a substantial proportion of pregnant women in lower-income countries.

18. In some African countries, yields from rain-fed agriculture could be reduced by up to 50 per cent by 2020 owing to climate change. This is likely to aggravate the burden of undernutrition in developing countries, which currently causes 3.5 million deaths each year, both directly through nutritional deficiencies and indirectly by intensifying vulnerability to diseases such as malaria and diarrhoea, and respiratory infections.

19. How we grow our food also impacts on human health via environmental factors. In Sumatra, recent peat fires associated with clearing of agricultural land have forced the evacuations of infants from the region with air quality indices remaining above 1000 for several weeks (>300 is deemed dangerous).

20. While research on the health impacts from exposure to agrochemicals is limited, evidence is starting to build. Recent research explores the health impacts of pesticides as ‘endocrine disrupting chemicals’ (i.e. chemicals that interfere with hormones). In the EU alone, pesticide exposure causes the highest annual health and economic costs at roughly \$127 billion, almost four times as high as the second highest category (plastics).

The impact of food consumption and production on ecosystems and biodiversity

21. It is estimated that 52 per cent of land used for agriculture worldwide is moderately or severely affected by land degradation and desertification.

22. Eutrophication has contributed to the creation of over 400 oceanic dead zones worldwide, primarily concentrated in Europe, eastern and southern US, and Southeast Asia. In total, these zones cover a total area of 245,000 square kilometres, or more than half the size of California.

23. Agriculture is thought to cause around 70 per cent of the projected loss of terrestrial biodiversity. In particular, the expansion of cropland into grasslands, savannahs and forests contributes to this loss.

24. Agriculture also makes positive contributions to nature, if well-managed. Sowing crops that bloom in different periods may increase wild-insect populations. In Sweden, bumble bee reproduction was improved in landscapes with both late-season flowering red clover and early-season mass-flowering crops. As a result, an adequate proportion of cropland in heterogeneous landscapes can be beneficial to some wild fauna taxa if appropriate crop management practices are adopted.

We cannot manage what we do not measure

25. There are many benefits provided by agriculture but also many costs. These benefits and costs are often invisible in the sense that they are not traded in the market and do not have a market price. But they do nonetheless impact on our wellbeing. All of these invisible as well as visible impacts will need to be assembled and evaluated through a universal framework, in order to provide analytical consistency and comparability across systems, across policies, and across business strategies.

26. These positive and negative impacts might be created by one agent in society but borne by others, i.e. they are positive and negative 'externalities'. The large negative externalities arising from our eco-agri-food systems complex can be addressed by a range of regulatory reforms, policy reforms including fiscal policies and incentives, and market-based mechanisms.

27. A universal, widely accepted framework for recognising, demonstrating and, where appropriate, capturing the values of these externalities will play an important role in addressing this challenge. Furthermore, to be comprehensive, all hidden costs and benefits of different food systems must be assessed in their entirety, both in terms of their life cycle and their impacts on all dimensions of human well-being.

28. The full range of stakeholders will need to be involved in managing and reducing negative externalities and increasing the provision of positive externalities: farmers, agri-businesses involved at all stages of the value chain (in food processing, distribution and disposal), government entities (at local, national, regional and international levels), and citizens.

29. The first step, however, is to categorize and measure these impacts and externalities, as we cannot manage what we do not measure.

TEEB for Agriculture and Food (TEEBAgFood) – changing the discourse on food systems

30. The TEEBAgFood study is designed to provide a comprehensive economic evaluation of the 'eco-agri-food systems' complex, and demonstrate that the economic environment in which farmers operate is distorted by significant externalities, both negative and positive, and a lack of awareness of our dependency on nature.

31. The 'eco-agri-food systems' complex is a collective term encompassing the vast and interacting complex of ecosystems, agricultural lands, pastures, fisheries, labour, infrastructure, technology, policies, culture, traditions, and institutions (including markets) that are variously involved in growing, processing, distributing and consuming food.

32. Operations within the entire agricultural value chain - production, processing, distribution, consumption and waste - not only have impacts but also depend on the state of the environment,

socio-economic well-being, and human health.

33. TEEBAgFood seeks to overcome the common practice of viewing ecosystems, agriculture and food systems as distinct ‘silos’. A selective analysis, not recognizing agriculture holistically, leads to suboptimal decisions with far-reaching consequences.

Exploratory TEEBAgFood Interim Report studies

34. TEEBAgFood has commissioned a series of exploratory studies that attempt to populate the TEEBAgFood framework: livestock (dairy, poultry and beef production); rice; palm oil; inland fisheries; agro-forestry; and maize.

35. Indicative results demonstrate that (i) it is possible to quantify and value a sub-set of the positive and negative impacts and externalities in the framework and (ii) in so doing, we can highlight outcomes that both improve human livelihoods and also reduce impacts and dependencies on ecosystems and biodiversity. As such, we have some of the theoretical building blocks for assessing the ‘true cost’ of food, including the impact of food production on human health and well-being.

36. Worldwide, around 80 million hectares of irrigated lowland rice provides 75 per cent of the world’s rice production. This predominant type of rice system receives about 40 per cent of the world’s total irrigation water and 30 per cent of the world’s freshwater resources withdrawn from the natural cycle .

37. The System of Rice Intensification (SRI) includes intermittent flooding, the transplanting of young (8-10 day old) single rice seedling, and applying intermittent irrigation and drainage to maintain soil aeration. In addition, the use of a mechanical rotary hoe or weeder is suggested under SRI to aerate the soil and control weeds.

38. The rice study compared SRI with conventional production methods. In Senegal, the impacts of water consumption under conventional systems was valued at US\$801/ha as compared with US\$626/ha under SRI. Further, revenues per hectare are estimated to be higher under SRI (US\$2422/ha) versus conventional (US\$2302/ha). Switching to SRI, society could save around \$11 million/annum in water consumption related health and environmental costs in Senegal, and at the same time the rice producing community would gain around US\$17 million through yield increases.

39. This is one of many examples of win-win outcomes generated by our exploratory studies. In other cases, the research highlights trade-offs between categories of positive and negative impacts and dependencies. The results are suggestive of additional insights that can be gained by widening and deepening the lens.

TEEBAgFood Next Steps – lessons learned from the exploratory studies

40. The exploratory studies commissioned by TEEBAgFood have led to the following suggestions for further research:

- a. Include all significant dependencies and impacts from biodiversity-agriculture linkages, as critical elements in understanding the economics of ecosystems and biodiversity;
- b. Typologies evaluated should include mixed systems, reflecting the full complexity and diversity of smallholder agriculture, and suggestive of resilient production systems at larger scales;
- c. Off-farm dependencies and impacts to be included, taking the full 'eco-agri-food' value chain as boundary, to inform our analysis;
- d. Health impacts to be included - arising from unhealthy diets, or arising from agricultural impacts on air quality, water quality, and vector-borne diseases, as important elements in tracing the hidden costs of current production and consumption patterns;
- e. The full gamut of impacts and externalities identified in the TEEBAgFood framework should be applied across all major system typologies, developing and informing efforts to identify 'full cost pricing' of food.

Towards an engaged TEEBAgFood community

41. This Interim Report has sketched out the myriad and inter-related factors that link agriculture, food, and human well-being. It is a call for evidence and contributions, addressed to institutions and experts (contributors, authors, reviewers, practitioners in policy and business, and civil society representatives).

42. TEEBAgFood intends to commission and synthesize research that generates the complete picture, therein providing important evidence for policy interventions. By identifying various points in the value chain where the most important impacts and dependencies between the different systems occur, TEEBAgFood has developed a robust analytical frame that can inform and influence policy debates on food systems, and underlying relationships to ecosystems and biodiversity. It will also make solutions towards sustainability more accessible, with the Sustainable Development Goals as a possible policy 'hook'.

43. At all levels -policy, corporate and individual- the economic invisibility of natural wealth and degradation is influencing both the short and the long term sustainability of agriculture and food systems. Therefore, TEEBAgFood foresees different messaging for different target groups and cross-sectoral engagement of government, private, academic and civil society stakeholders. TEEBAgFood will aim at gaining better engagement not only with the 'unaware', but also with 'critics'.

44. The four guiding principles uniting this community are 'quality', 'transparency', 'inclusion', and 'change' with the overall objective being to better inform the management and stewardship of the various components of the eco-agri-food systems complex.



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Making nature's values visible

