Agriculture - Submission to the UNFCCC

Union of Concerned Scientists

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The Union of Concerned Scientists is pleased to submit its views on the role of agriculture in the future work of the UNFCCC. Since the request for submissions did not specify particular questions to consider, and since this discussion is just beginning, we do not go into detail on any aspect. Rather, our submission is aimed at sketching out the broad outlines of the issues related to agriculture that the UNFCCC should consider in coming years.

Why talk about agriculture in climate negotiations?

On both the adaptation and mitigation sides of climate change, agriculture is a key element of the global response to climate change. It matters for adaptation because the threat of climate change to food security, and particularly to the world's most vulnerable farmers, is one of the greatest dangers that the world's people face today. It matters for mitigation because it is the source of about a fourth of humanity's greenhouse gas emissions – about half of that directly, through such sources as methane emissions from ruminants and manure and N_2O emissions from fertilizer and wet rice cultivation, and the other half indirectly, by its impact as the major driver of tropical deforestation (Figure 1). Thus, the UNFCCC cannot ignore agriculture. **SBSTA should begin to work on agriculture to develop sustainable, appropriate solutions for adaptation and mitigation or, even better, solutions that work for both.**

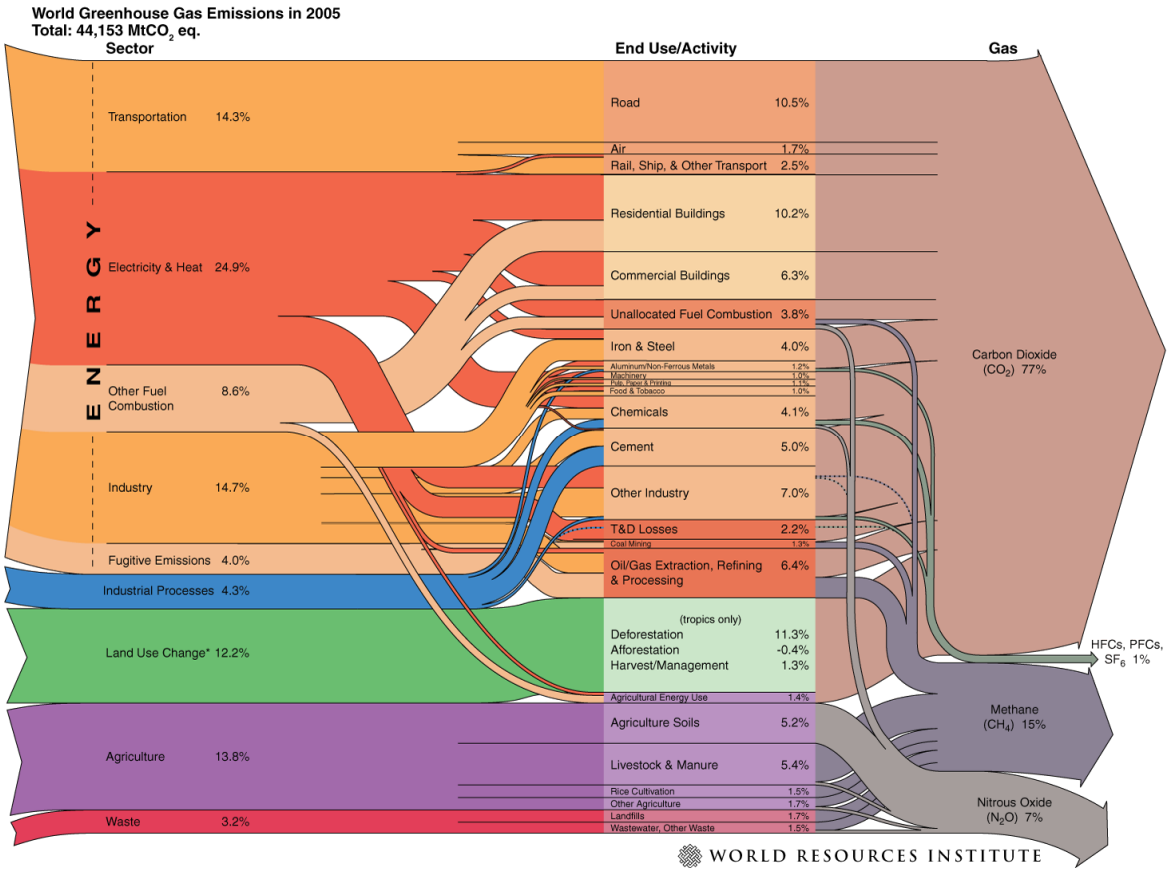

Figure 1. World greenhouse gas emissions in 2005. The green and purple arrows represent emissions that are mostly or entirely due to agriculture. Source: Herzog 2009.

Alternatives to consider as adaptation and mitigation solutions

There are many options for adaptation and mitigation that, with appropriate considerations and safeguards, should be considered by the UNFCCC. These can increase food security, specifically address the needs of small-scale farmers, promote national policies that integrate agriculture into planning and development, and encourage diverse agricultural systems that avoid unintended negative impacts on human and environmental health. This is not an

exhaustive list, but rather one that puts forward some solutions at the scale needed to address this global issue.

Low-carbon – and low-methane and low-nitrous-oxide – alternatives for agriculture can be the foundation for sustainable, low-emissions development. The importance of methane emissions to global warming, and the fact that it is a short-lived climate forcer with high global warming potential makes it a prime candidate for action. Ruminant livestock are the source of the majority of humanity's methane emissions, both directly and through their manure.

Shifting meat production away from beef and toward humane production of poultry and pork can be an important way to reduce these emissions. It would also reduce the need for both pasture and cropland, since beef cattle produce much less meat, whether calculated per hectare of land or per quantity of grain consumed, than the alternatives. Thus, it will reduce the pressure for deforestation, particularly in Latin America where pasture expansion is by far the largest driver of deforestation (Boucher et al. 2011).

Inefficient use and overuse of nitrogen – in both synthetic fertilizers and manure – is a leading source of N_2O, which has a global warming potential 300 times that of carbon dioxide. Nitrogen fertilizer is also a major pollutant of both rivers and streams, causing eutrophication, and of ground water, with serious health effects. Agricultural systems that use long rotations, cover crops, and organic nitrogen sources lose much less nitrogen than ones relying on large quantities of synthetic fertilizer (Gardner and Drinkwater 2009). Promoting less nitrogen-leaky management systems and reducing N_2O emissions both on and off farms would thus have important co-benefits for both human and ecosystem health.

Soil carbon is key to the land's productivity, and its loss through erosion and inappropriate cultivation systems is both a source of CO_2 emissions and a threat to food security. While it is not yet clear how much or how permanently soil carbon can be increased for mitigation results, the adaptation benefits of increased organic matter are clear and should be promoted.

There are promising ways to integrate crop, livestock and forest production in various combinations. Agroforestry and silvo-pastoral systems have been developed in many regions and

can be beneficial in terms of reduced emissions, higher yields and long-term maintenance of ecosystem health. By diversifying sources of nutrition and income, they also help increase food security and alleviate poverty.

In considering adaptation and mitigation strategies for agriculture, SBSTA should pay particular attention to the needs of the smallholders who are the large majority of the world's farmers. They tend to be more efficient producers; it has long been noted that they get higher yields per hectare than large farmers when they have access to the same resources (Sen 1962, Carter 1984). Climate change poses a special risk to smallholders, who generally have little savings other than their land and livestock, and thus are especially vulnerable to disruptions. Furthermore, their agriculture is the basis for rural economies around the world, supplying the food and other needs for billions of fellow villagers and other consumers. Thus, their adaptation needs ought to be a particular emphasis of SBSTA's work. With access to research on region-specific integrated crop-livestock systems, locally-adapted animals and plants, and diverse rotations, they will be even better-positioned to adapt to climate change and contribute to food security.

Adapting and mitigating at the planetary scale

Many of the most promising strategies to deal with climate change require national and global-scale changes that take into consideration trends that are already important. With climate change the ideal regions in which to produce specific crops and livestock will move around geographically. Land use planning, the allocation of credit and technical aid, and the development of transport systems and infrastructure will all need to take this into account. Alternative systems of land tenure, such as the recognition of Indigenous Peoples' collective property rights by governments, are being developed and can help provide the security that the users of farm and forest land need to be able to adapt to changing climates. World trade, a growing proportion of the global food supply, will inevitably be impacted by climate change as well as by demographic trends such as urbanization and diet shifts such as increasing meat consumption. The UNFCCC should consider agriculture in light of these trends, even though this

brings it into areas that have traditionally been the provinces of other national and international bodies.

Global land use patterns have changed dramatically in the past few decades as large-scale commercial agriculture and livestock production has expanded in the developing as well as developed countries. While the overall extent of cropland, as well as the area devoted to cereals and root crops, have only increased slightly, the area in oilseeds – particularly soy and oil palm -- has more than doubled in the past four decades (U.K. Government Office for Science 2011). Pastureland has grown more rapidly than cropland for many years and now makes up two-thirds of the world's agricultural land (Figure 2).

These changes have increased emissions and often have decreased, rather than increased, the efficiency of global food production. New pressures, some developing as responses to climate change, include the use of cropland to produce bioenergy feedstocks and the diversion of substantial amounts of the grain supply to biofuel production.

There is thus competition for land among multiple uses. Some of these uses, such as the sequestration of carbon by natural forest growth which absorbs up a third of global emissions, contribute substantially to slowing global warming and thus help to avert its worst consequences. Others, such as biofuels and pasture expansion, could have substantial negative impacts on the climate, as well as pushing food prices higher and thus threatening food security.

A critical opportunity at the intersection of agriculture and climate change mitigation is the need to reduce food waste. Food waste expands the acreage of land needed to grow food, and, in more energy-intensive systems, represents wasted energy (and associated emissions) used to produce the food that isn't consumed (Hall et al. 2009). In some parts of the world, food waste occurs mainly because growers lack storage facilities to protect harvested plants from rotting. Identifying regionally-appropriate actions to reduce food waste and creating mechanisms to support those actions ranks high on the list of opportunities to mitigate climate change through agriculture.

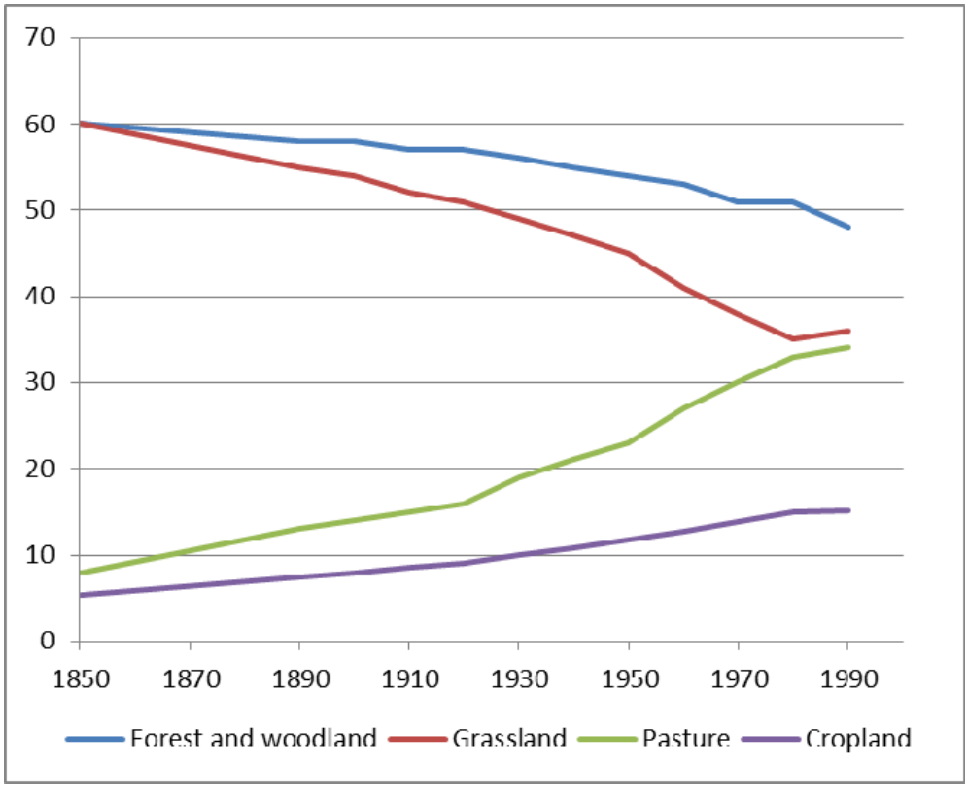

Figure 2. Changes in global area in different kinds of vegetation (million km^2) since 1850. Pasture has increased considerably faster than cropland; it now comprises about two-thirds of the world's agricultural land. Data from Table 2 of McNeill 2006.

Environmentally and socially sustainable increases in yields and efficiency can help reduce the pressure on the world's land base. Given the need to support diverse, regionally-appropriate, climate-resilient agriculture for small-scale farmers and the trend for private-sector funds to support capital-intensive agriculture, it is urgent to reverse the decline in support for public agricultural research and extension over the past few decades. But it is equally important to create the incentives that discourage wasteful and high-emitting land use patterns. In this respect, REDD+ is a particularly valuable policy to promote, since reducing the availability of free or cheap forest land for agricultural expansion will make raising yields and reducing waste more economically attractive as alternatives to low-productivity, extensive production.

Agriculture will change rapidly in coming decades, both because of climate change and because of economic trends that are already manifest. **The UNFCCC's challenge is to find and promote ways to guide these changes in directions that lead to a more diverse and climate-resilient agricultural landscape, reduce emissions, increase food security, and use the planet's resources in ways that are fair and beneficial to all.**

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