Switzerland

Issues related to Agriculture

September 3, 2013

Switzerland is pleased to submit its views on the current state of scientific knowledge on how to enhance the adaptation of agriculture to climate change impacts while promoting rural development, sustainable development and productivity of agricultural systems and food security in all countries, particularly in developing countries, taking into account the diversity of the agricultural systems and the differences in scale as well as possible adaptation co-benefits, in response to the invitation of the SBSTA (paragraph 2 of the draft conclusion FCCC/SBSTA/2013/L.20).

Introduction

Agriculture is a key sector for food security, for rural development and the livelihoods of millions of people in the world, and for the functioning of vital eco-systems. The agricultural sector is severely affected by climate change, and at the same time it is also responsible for a significant share of greenhouse gas emissions. Accordingly, Switzerland is addressing both challenges, adaptation of the agricultural sector to climate change and mitigation of greenhouse gas emissions from the agricultural sector, with the same level of priority.

To respond adequately to the invitation of the SBSTA mentioned above, emphasis in this submission will be put on the current state of scientific knowledge on how to enhance adaptation of Switzerland's agriculture to climate change impacts while promoting productivity of agricultural systems and food security, and taking into account adaptation co-benefits such as mitigation of greenhouse gas emissions from agriculture.

The Swiss policy setting

The Swiss Government (Federal Council) is currently working on a strategy on adaptation to climate change which will serve as a national framework to coordinate the course of action in responding to the expected impacts of climate change. The adaptation strategy is divided into two parts. The first part, which was adopted by the Swiss Federal Council in 2012, describes the goals, challenges and fields of action in adapting to climate change in Switzerland. In the second part, sectoral (including agriculture) and cross-sectoral adaptation measures are presented and coordinated in a joint action plan. It will be completed by the end of 2013 and is expected to be adopted in early 2014. The legal basis for adaptation activities by the Government is provided by the revised CO_2 act (article 8 on coordination of adaption measures), which came into effect on 1 January 2013. It mandates the Government to coordinate measures to prevent and cope with damages to people and assets caused by increased greenhouse gas concentrations in the atmosphere, and to ensure that the basis for adaptation are made available.

The adaptation activities planned in the agricultural sector under the frame of the adaptation strategy will help to achieve the targets of the Swiss climate strategy for agriculture. The Swiss climate strategy for agriculture is a voluntary commitment of the agricultural sector to: a) increase productivity while b) reducing greenhouse gas emissions.

Accordingly, the strategy has a two-fold target (see Fig. 1):

(1) With regard to adaptation, the Swiss agricultural sector should be able to improve production and public services over the long term;

(2) With respect to the reduction of greenhouse gases, the target comprises two parts: firstly, emissions by the agricultural sector are to be reduced by at least one-third through technical and operational measures by 2050; and secondly, an overall reduction of two-thirds should be achieved if food consumption patterns support greenhouse gas reduction.

These are ambitious, yet realistic targets, given the long time horizon of the climate strategy of 40 years. The Swiss climate strategy for agriculture describes various fields of action to reduce greenhouse gas intensity of agricultural production and possible measures to adapt agricultural production to climate change.

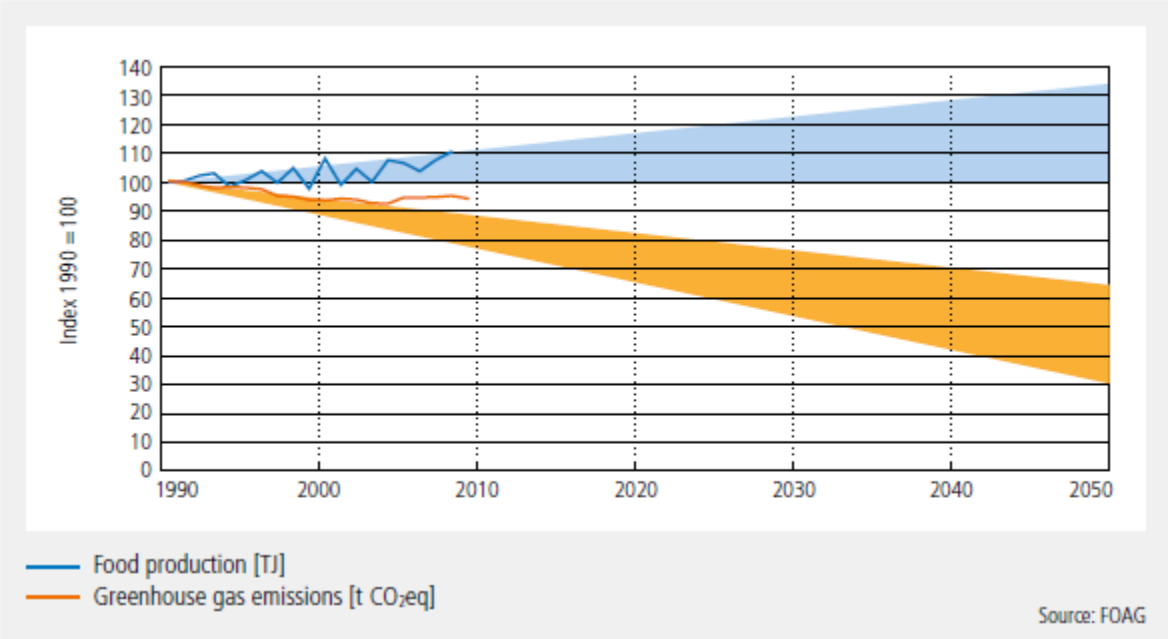

Figure 1: Target paths with regard to food production (blue, upper curve and range) and greenhouse gas emissions (orange, lower curve and range) as well as trends since 1990 (base year). Source: Swiss Federal Office for Agriculture FOAG.

Climate change impact on Swiss agriculture

The recently released Swiss Climate Change Scenarios “CH2011” provide a new assessment of how climate may change in Switzerland over the 21st century.

In the course of the 21st century, Swiss climate is projected to depart significantly from present and past conditions. Mean temperature will very likely increase in all regions and seasons. Summer mean precipitation will likely decrease by the end of the century all over Switzerland, while winter precipitation will likely increase in Southern Switzerland. More specifically, the length of summer dry spells is likely to increase. Switzerland is part of a larger area experiencing an increasing risk of drought and dry spells along with a decrease in the number of precipitation days. On the other hand, despite a decrease in total summer precipitation amounts, several studies suggest a potential increase in extreme daily summer precipitation over central Europe (Frei et al. 2006).

At a general level, climate change in Switzerland is resulting in a shift of suitable areas for agricultural production, and involves both positive aspects (e.g. a longer vegetation period due to rising temperatures) and negative aspects (e.g. increasing problems regarding pests owing to the milder winters). The increase in extreme weather events is a major problem since they reduce the reliability of harvests. Similar to other countries, the effects of climate change are not homogenously distributed: there are regional differences and it can depend on the individual farm's starting point, if the changes are positive or negative.

Adaptation needs

To achieve good production results, crops and animals must be optimally adapted to local climate. Accordingly, this needs to be taken into account when selecting and breeding. How climate change affects pest infestation and control, for example, must be clarified, as well as how the extension of the growing season can be optimally used for crop production. With an increase of hot days, animal farming also requires solutions that enable animal welfare and high performance.

Droughts increase the need for water and restrict the soil's ability to absorb water. Conversely, heavy rains erode arable land. Which management measures (such as adapted tillage, crop rotation or variety selection) can counteract such developments thus must be examined. More frequent periods of water scarcity require careful handling of available water. Water-sparing production systems should therefore be encouraged and new forms of water storage and irrigation developed and propagated.

Which kind of agricultural production is best suited for climatic influences in each location must be more carefully considered in the future. Currently existing data and information sources need to be adapted to create, for example, soil moisture and pest infestation forecasts and regionally differentiated cultivation. The many open questions about the impact of climate change on agriculture as well as existing adaptation options will be addressed in the next few years within the framework of a research programme and a participatory consultation process with all stakeholders concerned.

Interactions between climate change impact, adaptation, agricultural productivity and mitigation

In the following, we would like to illustrate the current state of scientific knowledge on interactions between climate change impact, adaptation to climate change, agricultural productivity and mitigation of greenhouse gas emissions in Switzerland with two examples.

Crop-specific climate suitability map: Increasing temperatures and increased drought risk during summer are likely to cause a change in the suitability of areas for crop production in Switzerland. To be better able to cope with this change, Swiss Federal Agricultural Research presently develops and applies a flexible method for quantifying climatic production potentials and limitations for important crops in Switzerland under current and projected future climate conditions. A spatially explicit evaluation highlights regions with greatest production potentials and identifies the region-specific limitations (e.g. heat, frost, water limitations) today and in the future. This information can help to support decisions in short- and longterm regional agricultural planning (e.g. planning of irrigation infrastructure, spatial shifts in cultivation zones) (Holzkämper et al. 2013). The crop-specific climate suitability map is an important scientific basis to maintain – or even increase – agricultural productivity under changing climatic conditions. Generally speaking, cropping systems that are well adapted to the agro-ecological conditions of a site can often achieve higher performance with less inputs (such as fertilization, plant protection, irrigation and energy). As a consequence, greenhouse gas emissions per product unit are usually lower than in sites where agricultural activities are less well supported by agro-ecological conditions.

Further tools that are presently being made available to farmers are an erosion risk map and a compaction risk calculator ("Terranimo"). These tools enable farmers to manage their soils in a careful way, also under changing climatic conditions such as more extreme rainfall events, und thus to secure soil productivity on a longer term. At the same time, these tools, through reduced erosion and compaction, will help to maintain soil carbon content and prevent an increase of nitrous oxide and net methane emissions from soils, respectively.

Temperature-humidity index in animal husbandry: Climate change is leading to higher temperatures across Switzerland, increasing the risk of heat stress in livestock. Analysis of a «Temperature-Humidity Index» at various locations showed that the heat stress risk for dairy cows grew substantially on a daily average over the past 30 years, whereas the maximum of the index did not change much. Projections on the basis of two climate scenarios for the time period 2036–2065 show a marked increase in the number of days with heat stress, particularly at warmer sites in the Southern and Western parts of Switzerland. The results emphasize the need for measures to be taken in order to adapt animal husbandry to future climate change. Such measures could be: ensure availability of drinking water to cover increased fluid requirements, provide shaded areas in pastures and free-range areas, change grazing management to increased night grazing and/or seasonally shift grazing to higher altitudes, and adaptation of breeding programs (Fuhrer and Calanca 2012). As ruminants have a high basic turnover of greenhouse gas emissions, maintenance or increase of performance per animal by the measures mentioned to lower heat stress and increase animal health contributes to reducing greenhouse gas emissions per unit livestock product (milk, meat).

Conclusions

According to Switzerland's experience, climate change impacts, adaptation measures, increase of agricultural productivity and mitigation achievements must and can be closely interlinked: knowing the impact is a necessity to conceive effective and efficient adaptation measures, and adaptation measures are a prerequisite to maintain – or even increase - agricultural productivity in a changing climate. As more is produced with less emissions, increased agricultural productivity can bring along the co-benefit of greenhouse gas emissions mitigation effects, which, in the sum, reduces climate change impacts globally – an approach that addresses the problem at its roots and at the same time contributes to food security. To cope with climate change challenges efficiently, adaptation measures are most useful when bringing along mitigation effects. Thus, from a strategic point of view, it is most expedient to give priority to those measures where synergies between adaptation and mitigation can be expected.

References

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