

question 2: "How do various processes under the Convention facilitate the identification and assessment of risk and vulnerability of agricultural systems in the context of different climate change scenarios in your country?"

New Zealand work to understand risk and vulnerability to climate change:

- New Zealand has conducted a number of detailed assessments of the climate risk posed to our primary sectors, both agriculture and production forestry.
- These have not occurred directly under Convention processes but rather our engagement in the UNFCCC has helped to initiate domestic programmes.
- For example, our reporting under the Convention is a chance to self-reflect on what we have done well and where further work is needed.
- While workshops such as this one are opportunities to hear the experiences of others and integrate these ideas into new programmes back home.
- Work has generally involved the down scaling of global climate forecasts, such as those developed for IPCC processes, to understand changes to New Zealand's temperature, rainfall, wind, and drought frequency.
- New Zealand has recently initiated a new down-scaling project, CCII (Climate Changes, Impacts & Implications), which is a targeted research project that will update and improve projections of climate trends, variability and extremes across New Zealand out to 2100, based on the latest global projections.
- In addition to understanding impacts on land-use, the project also has a focus on climate change impacts on natural ecosystems and native species.
- The project research aims can be seen on the screen, and includes aims to identify feedbacks, understand cumulative impacts, and recognise limits; and also exploring options for New Zealand under different global climates.

Understanding risk and vulnerabilities

- Once climate forecasts are downscaled for the New Zealand context, further research focuses on the first order impacts of increased temperature and changes to rain and wind, and as Alexandre mentioned, it is important to include changes to variability between years and within years (eg reduced summer rain, increased winter rain).
- Recent research has looked at second order effects such as pests and disease, fire risk and wind throw impacts in forest, but also changes in nutrient cycling and ecosystem services.
- Research has also started to look at interactions within these second order impacts. For example, recent research has looked at the spread of tropical grasses southward within New Zealand, which could be expected with a warmer drier climate and, if occurred, would have a major impact on our pastoral agricultural industries.
- Research found that when the changes in nutrient cycling and shift to a warmer drier climate were combined, the threat of tropical grass dominance was lowered, compared to a scenario of only a warmer drier climate.

First order impacts

- Research has found that climate change is expected to intensify current climate phenomena already experienced in New Zealand.
- It is important to understand that almost none of New Zealand's rain comes from evaporation off the land. Instead, it is sustained by moisture from our surrounding oceans.
- Whereas warming can make continental land masses drier and more arid, this will not be such a factor for New Zealand.
- The hydrological cycle will however likely become more energetic. Rainfall can be expected to become more infrequent but more intense.
- The dominance of westerly winds in New Zealand is expected to increase, meaning that already drier eastern regions will become drier than present and already wet western regions even wetter than present.
- This will increase both drought and flood frequency and severity.
- A major challenge for New Zealand is caused by the presence of hundreds of micro-climates that result from the interaction of this hydrological cycle and New Zealand's mountainous landscape and associated river valleys. River valleys are important agricultural regions for wine and fruit production in New Zealand.
- Due to these micro climates, climate estimates are expressed as probabilities or a range of possible changes. Local observations will be an important tool for land managers adapting to climate change.

Adaptation and management

- In order to further understand risk, recent research has begun to focus on management options at the farm level.
- An adaptation framework was developed that categorised measures into three categories, tactical adaptation, strategic adaptation and transformational adaptation.
- Tactical adaptations can be made in day-to-day to seasonal management decisions, and can occur in response to an observed change in climate. For example earlier sowing or mating.
- Strategic adaptations involve making more substantial and risky management decisions over a 5-10 year period, such as switching to new cultivars or animal breeds. Such decisions will begin to rely more heavily on accurate local climate forecasts.
- A transformational adaptation, such as a movement away from historical land use to one more suitable to a changing climate, must be made with a long-term time horizon and relies on a high level of confidence in local climate forecasts.
- We still have a way to go in New Zealand. The only major programme in New Zealand currently to facilitate transformational adaptation is to increase the area under irrigation in drought prone areas. This work is sometimes facilitated by Government, for example through economic feasibility studies, but also involves private sector investment.

- However as we move forward, and as climate forecasts are downscaled, we will need to provide a higher level of downscaling to support transformational changes to New Zealand land use.

Sustainable land management and climate change

- I will finish by noting that, where possible, New Zealand seeks to take a holistic approach to land use research.
- Research on land sector climate change impacts in New Zealand occurs under the 'Sustainable land management and climate change' programme.
- Research considers a broad range of social, economic and environmental factors.
- This is important to ensure that adaptation options developed are able to be implemented in farming systems, rather than result in unworkable advice due to unidentified social, economic or environmental short-falls. And this message is one that we receive from farmers.
- For example, due to the impact of land use on water quality, New Zealand land managers increasingly face regulations and restrictions on the level of nutrient loss permissible from land holdings. Adaptation options which result in a large increase in nutrient loss are unlikely to be embraced and implemented by both farmers and communities.
- This holistic approach extends to water quality policy, where measures must have regard to the effects of a changing climate.

Conclusion

- To conclude, New Zealand has found that downscaling, to the extent that it is possible, is vital to understand the risks climate change creates for land managers, and also vital in order to allow land managers to develop adaptation options.
- In New Zealand we still have a way to go. However, in order to allow land managers to make adaptation decision on a long term timeframe land managers must have confidence in the climate forecasts for their individual community. The US also made this point that solutions need to be appropriate at a local level.
- Programmes to down scale climate scenarios and understand sustainable adaptation options can assist farmers to make appropriate land management decisions.