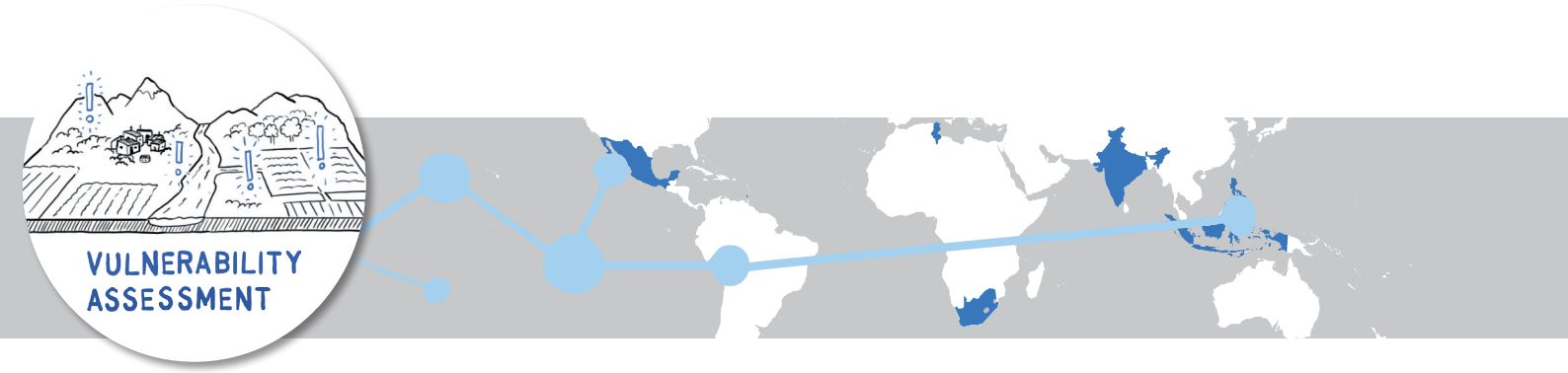


## Impact chain

# Climate change impact chain for rice

The major climate stimuli such as temperature, precipitation (rainfall, flooding), salinization, tropical ozone and tropical storms show different biophysical and socio-economic impacts on key agricultural crops such as rice, maize, millet, sorghum, and coffee.

In view of this, the **impact chain approach** analyses and highlights the consequences induced by the climate stimuli. In a second step, it shows the related impacts and identifies key adaptation measures to counteract the relevant stimuli (see impact chain).

Weather is a key factor in agricultural productivity, despite many technological advances. Climate change, however, is leading to changes in global and regional climates and more extreme weather events which have severe impacts on the growth of crops as well as on activities associated with agriculture and distribution of food. There is now an extensive and still a growing body of research which considers the impact of climate change and severe weather events on crops and agricultural systems and also applies modelling techniques to simulate their impacts on agriculture.

Based on a state-of-the-art literature review, a **climate stimuli chart** shows which climate stimuli is most critical at which crop production stage. For **rice,** erratic rainfall, flooding during ripening, salinization and tropical storms cause major biophysical impacts.

**Rice sensitivity chart**

| Climatic stimuli | Production phase | | | |
|---|---|---|---|---|
| | Germination | Growth/flowering/ fruit setting | Ripening | Harvest |
| Temperature | Some controversy | | | |
| Rainfall | Vulnerable to erratic rainfall | | | |
| Drought | Vulnerable | | | |
| Flooding | Vulnerable to prolonged flooding (except e.g. scuba rice) | | | |
| Tropical ozone | Harmful and leads to grain yield decrease | | | |
| Salinization | Problem in dry season | | | |
| $CO_2$ fertilization | Fairly strong positive effect | | | |

**How to use the tables**

The table lists, for each crop, a number of climatic stimuli and how they impact the crop in various development stadia (biophysical impacts) and socio-economic impacts.

**Red** high negative impact
**Yellow** medium negative impact
**Green** low or no negative impact
**Dark green** positive impact
**Blue** impact disputed
**Grey** seems not to be very relevant
**White** if no information present

On behalf of

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of the Federal Republic of Germany

Apart from presenting an overview of the impacts of climate stimuli on rice, the **impact chain approach** provides decision-makers with a first indication of where climate impacts may be felt earliest, and where interventions might be needed.

| Rice impact chain | | | |
|---|---|---|---|
| **Climatic stimuli** | **Biophysical impacts** | **Socio-economic impacts** | **Adaptation measures** |
| **Temperature** | Requires hot and humid climate with prolonged sunshine. Too high temperatures (above 40°C) can lead to reduced growth. | Due to change of the climatic situation and favourable climate stimuli rice may be grown in areas previously excluded from rice production.<br><br>However, in many rice producing areas, the adverse climate stimuli described on the left may cause:<br>• lower production and, if used for own consumption, leading to food insecurity,<br>• reduced income for farmers when rice is a cash crop,<br>• increased demand for rice causing higher prices at local markets and thus contributing indirectly to food insecurity. | • Use of heat tolerant cultivars (type of cultivar is region specific).<br>• Additional irrigation.<br>• Switch to other crops. |
| **Rainfall** | Highly vulnerable to erratic rainfall and drought periods especially during growth. | | Additional irrigation during dry spells especially at growing stage. |
| **Flooding** | Tolerates waterlogged conditions during vegetative stage, however cannot withstand standing water during ripening stage (except for scuba rice). | | Drainage during ripening stage. |
| **Salinization** | Rice is sensitive to salinity, particularly during the seedling stage and in dry periods. | | • Use of irrigation water with low salinity.<br>• Use of salt tolerant varieties (regions specific).<br>• Soil improvement measures (before plantation, flooding of fields helps washing out salts), plantation of soil extracting plants (region specific) as alternative crops. |
| **Tropical storms** | Rice is most vulnerable to damage at the heading stage of its development. | | Introduction of early warning systems. |
| **Tropical Ozone (especially near urban centres)** | Reduced yield due to high ozone concentration. | | No measures applicable. |

Get the full report with a detailed analysis on sorghum, millet, coffee and maize here or on AdaptationCommunity.net > Knowledge > Vulnerability Assessment > Further Reading.

AdaptationCommunity.net

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