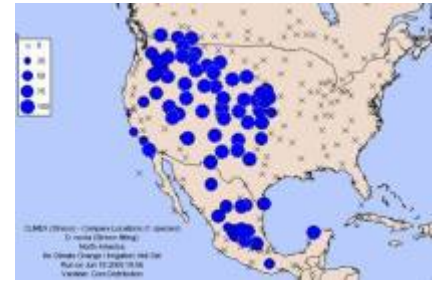# Climate Change

The CLIMEX software enables users to consider the potential implications of either climate change or irrigation practices on both the similarity of meteorological data of different places (Match Climates) or the potential geographical distribution and seasonal phenology and survival of species (CLIMEX model). These changes may have implications in a number of areas. As species' distributions change, some areas currently unsuitable for the species may become suitable. Alternatively, a change in the climate may force a species' range to contract or move – this has implications not only for pests but also rare and threatened species of conservation value. Changes in the climate may affect important agricultural industries if areas become unsuitable for the crops currently being grown there. By allowing the user to assess likely situations in the future, this option provides the rationale to initiate management or adaptation strategies to cope with the projected changes.

The Climate Change scenario module enables users to examine the impact of different temperature and rainfall conditions. New scenarios may be added or unwanted scenarios deleted. Scenarios can apply changes to summer and winter months separately in temperate zones and a different change can be made to a user-defined equatorial zone. Once a scenario has been selected, its parameters can be changed.

Climate Change Scenario parameters

- **Minimum Temperature Change, Winter** - The change in the minimum temperature that occurs during the 'Winter' months outside the Equatorial zone.
- **Minimum Temperature Latitudinal Change, Winter** - The change in the minimum temperature for each degree of latitude away from the equator that occurs during the 'Winter' months outside the Equatorial zone.
- **Minimum Temperature Change, Summer** - The change in the minimum temperature that occurs during the 'Summer' months outside the Equatorial zone.
- **Minimum Temperature Latitudinal Change, Summer** - The change in the minimum temperature for each degree of latitude away from the equator that occurs during the 'Summer' months outside the Equatorial zone.
- **Minimum Temperature Change, Equatorial Zone** - The change in the minimum temperature that occurs inside the Equatorial zone.
- **Maximum Temperature Change, Winter** - The change in the minimum temperature that occurs during the 'Winter' months outside the Equatorial zone.
- **Maximum Temperature Latitudinal Change, Winter** - The change in the maximum temperature for each degree of latitude away from the equator that occurs during the 'Winter' months outside the Equatorial zone.
- **Maximum Temperature Change, Summer** - The change in the maximum temperature that occurs during the 'Summer' months outside the Equatorial zone.
- **Maximum Temperature Latitudinal Change, Summer** - The change in the maximum temperature for each degree of latitude away from the equator that occurs during the 'Summer' months outside the Equatorial zone.
- **Maximum Temperature Change, Equatorial Zone** - The change in the maximum temperature that occurs inside the Equatorial zone.
- **Rainfall Change, Winter** - The change in the rainfall (in %) that occurs during the 'Winter' months outside the Equatorial zone.
- **Rainfall Latitudinal Change, Winter** - The change in the rainfall (in % per degree latitude) for each degree of latitude away from the equator that occurs during the 'Winter' months outside the Equatorial zone.

- **Rainfall Change, Summer** - The change in the rainfall (in %) that occurs during the 'Summer' months outside the Equatorial zone.
- **Rainfall Latitudinal Change, Summer** - The change in the rainfall (in % per degree latitude) for each degree of latitude away from the equator that occurs during the 'Summer' months outside the Equatorial zone.
- **Rainfall Change, Equatorial Zone** - The change in the rainfall (in %) that occurs inside the Equatorial zone.

The Equatorial Zone is a band of latitude centred on the equator and its exact extent is defined in the Model Preferences dialog. "Winter" and "Summer" seasons are defined with reference to the Equatorial Zone and the day of year. North of the Equatorial Zone, "Summer" is defined as days 92 to 274 (i.e., March 2 – September 30, inclusive), with "Winter" being the rest of the year. South of the Equatorial Zone, these are reversed.

Irrigation Scenarios

The Irrigation scenario builder acts in a similar way to the Climate Change scenario builder with two exceptions. Firstly, it treats all regions equally and it only affects the amount of additional, simulated rainfall. There are options to apply irrigation on a monthly rather than seasonal basis and to apply 'top-up' amounts of irrigation to increase the effective rainfall to a set amount, such as 3mm per day of (rainfall + irrigation), for example. It is particularly useful when considering the suitability of climates for a species that may only be present as a result of irrigation in agricultural or urban environments. Irrigation can affect both the growth and survival of species by enabling populations to persist and grow in what would otherwise be an unfavourable dry season.