Technical sheet

Policy

Europe: *RDP 2014- 2020. Priority N. 4, promoting resource efficiency and supporting the shift toward a low-carbon and climate resilient economy in the agriculture, food and forestry sectors. https://ec.europa.eu/sfc/en/2014/quickguides/PRGEAFRDP#-priority-1-5858.*

The EU Strateav on adaptation to climate change, COM(2013) 216, 16 april 2013, European commission.

First draft

TOOL CLIMATE CHANGE RESILIENCE – *Territorial Scale: European*

WHY

It is well established that climate change has both direct and indirect effects on agricultural productivity and – in many instances - it is connected to drought, flooding and the geographical redistribution of pests and diseases. With this tool future climatic scenarios can to be investigated in order to better plan territorial policy interventions so as to increase climate resilience of territories.

FOR WHOM

The "Climate Change Resilience" tool can be used preferentially at national level to build the National Adaptation Strategy and/or the National Adaptation Plan. The tool is also of interest for stakeholders (e.g. environmental protection authorities, water district authorities, regional parks, service management company, trade associations, non-profit associations, business groups) who are involved in national planning of adaptation strategy/plan.

HOW – if you want to *select your Region Of Interest (ROI)*[i]

The tool can provide data for any site in Europe. The user can select the Region of Interest (ROI) and retrieve the data of interest through a very simple procedure:

Operational procedure

- Simply select the Administrative limits or;
- Click on the "Draw (Polygon)" button on the top bar and draw the ROI boundary;
- Assign a name to the selected ROI[ii];
- Click on the "Save" button to keep the ROI available in the system for further queries.

TOOL LAND – GENERAL CLIMATIC ANOMALIES

Operational procedure

By selecting the "Climate change indicator" icon and then clicking on the "Land – General climatic anomalies" button from the Toolbox, the user can choose the region of interest previously saved (or Administrative limits), the IPCC scenario[iii] and the scenario period.

By accessing the "elaborations" sub-folder, in the "elaboration detail" folder, users can view - and download - the processing result, as a .pdf report that will contain the following climate anomaly set of indicators:

- Maximum Temperature anomaly Indicators
- Minimum Temperature Indicators
- Mean Temperature Indicators
- Precipitation anomaly indicators

Anomalies of the General Climatic Indicators are calculated (and thus reported) as the difference between the selected Scenario period (2041-2070 or 2071-2100) and the reference period (1981-2010), by taking into account the selected IPCC scenario (RCP4.5 or RCP 8.5)[iv].

What for

The tool can be exploited for the sustainable land planning. For example, an analysis of scenarios can be used by a policy maker to design policies that prevent and minimize the impacts of the climate change on the territory. The same can be said of planning of future activities that reduce environmental impacts and waste resources.

LIMITATIONS

Main limitations are due to the (i) the rather coarse spatial resolution (12 km); for this specific tool, CMCC suggests that reliable queries must refer to a minimum ROI of 5x5 pixel size (pixel width 12 km), (ii) inherent uncertainty of RCP climate scenarios (not discussed here).

FUTURE DEVELOPMENT

Yet to be established

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[i] Special care is required when user draws/select the Region of Interest. In fact LANDSUPPORT is a multi-scale decision support system. Each of the 15 available tools is designed for a specific application and for a specific scale. Furthermore, the databases using specific standards required for that specific scale. The users of LANDSUPPORT web platform must therefore be well aware of the limitation embedded in the different maps that they require for their specific application. The users must be expert on their specific problem and must understand if the input data offered by the platform are suitable for their problem. In light of the above, the system provides very reliable results only if used appropriately.

[ii] It is also possible to draw a ROI with numerous polygons. In this case, it is possible to assign different values (eg numbers) to each of the drawn polygons.

[iii] The RCP (Representative Concentration Pathway) scenarios developed by the IPCC foresee an increase in greenhouse gas emissions in the future.

- The RCP 4.5 scenario is consistent with a reduction in emissions in the future: it assumes that by 2070 carbon dioxide (CO2) emissions will fall below current levels and the atmospheric concentration will stabilize by the end of the century at around double the pre-industrial levels.
- The RCP 8.5 scenario is consistent with a future in which no emission reduction policies will be implemented; it assumes that by 2100 the atmospheric CO2 concentration has tripled or quadrupled compared to pre-industrial levels.

For additional information on the RCP scenarios: https://ar5-syr.ipcc.ch/topic_futurechanges.php

[iv] Here is given a brief explanation on methods employed to calculate future climate anomalies.

ENSEMBLE CORDEX EUR-11. The expected climate anomalies were conducted by Euro-Mediterranean Centre on Climate Change Foundation (CMCC)- Regional Models and geo-Hydrological Impacts Division (REMHI) by using CORDEX regional climate model (RCM) simulations available over the European domain (EURO-CORDEX) with resolution 0.11 degree (about 12 km) forced by different global climate models. The following links provide more information on the EURO-CORDEX initiative:

CORDEX Reference site: https://www.euro-cordex.net/index.php.en
CORDEX Publications with associated Digital Object Identifiers: https://www.euro-cordex.net/060380/index.php.en
CORDEX Terms of Use: http://is-enes-data.github.io/cordex_terms_of_use.pdf

REFERENCES

Bucchignani, E., Montesarchio, M., Zollo, A.L., Mercogliano, P. (2016). High-resolution climate simulations with COSMO-CLM over Italy: Performance evaluation and climate projections for the 21st century. Int. J. Climatol. 36, 735–756.

IPCC (2014). Climate Change 2014: Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Edenhofer, O., R. Pichs-Madruga, Y. Sokona, E. Farahani, S. Kadner, K. Seyboth, A. Adler, I. Baum, S. Brunner, P. Eickemeier, B. Kriemann, J. Savolainen, S. Schlo¨mer, C. von Stechow, T. Zwickel and J.C. Minx (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.

Scoccimarro E., S. Gualdi, A. Bellucci, A. Sanna, P.G. Fogli, E. Manzini, M. Vichi, P. Oddo, and A. Navarra, 2011: Effects of Tropical Cyclones on Ocean Heat Transport in a High Resolution Coupled General Circulation Model. Journal of Climate, 24, 4368-4384.

Zollo, A.L., Rillo, V., Bucchignani, E., Montesarchio, M., Mercogliano, P. (2016). Extreme temperature and precipitation events over Italy: Assessment of high-resolution simulations with COSMO-CLM and future scenarios. Int. J. Climatol. 36, 987–1004