

# Editorial

**C**LIMATE CHANGE is one of the major environmental issues for the coming years, both globally and regionally. The Intergovernmental Panel on Climate Change (IPCC) concludes that since 1900 the global mean temperature has increased on average by 0.8°C. In the past 30 years this warming was mainly anthropogenic, which means up to large extent attributable to human activities. Global climate scenarios for 21st century show a range of warming which is of a large concern for many regions around the world. We can no longer assume that the future climate will be a statistical replica of the past. Scientific evidence is mounting that frequencies and magnitude of climate extremes in the future are increasing as a consequence of anthropogenic climate change.

In the Netherlands the temperature has risen, on average, by 1.6°C since 1900. Regional climate scenarios for the 21st century developed by the Dutch Royal Meteorological Institute<sup>[1]</sup> show that temperature in the Netherlands will continue to rise and mild winters and hot summers will become more common. On average winters will become wetter and extreme precipitation amounts will increase. The intensity of extreme rain showers in summer will increase and the sea level will continue to rise.

Changing climate will affect all segments and sectors of the society and the economy of the Netherlands, but it also brings new opportunities for major innovations. Examples are opportunities for

emission low (re)development of country spatial infrastructure, to enhance land-use opportunities with respect to sources and sinks of greenhouse gases, to increase adaptive capacity in the management of, amongst others, agriculture, natural resources and water, and to enhance the protection of our infrastructure and thus the safety of our people. Meeting this challenge calls for a major investment in knowledge development and knowledge infrastructure. For the period between 2005 and 2014, two large research programmes have been initiated and funded in the Netherlands in response to this challenge: “Climate *changes* Spatial Planning” (CcSP) and “Knowledge for Climate”. Both programmes are supported by the Dutch Government from a so called Economic Structure Enhancing Fund (FES), providing funding of 90 million Euro, and by participating organizations and stakeholders, which bring up an additional 110 million Euro.

The programmes are built around the principles of “Climate proofing”<sup>[2]</sup>. Climate proof development does not mean a zero-risk, which would not be a realistic or economically viable approach for any country or region in the world. Our programmes embrace the climate proofing concept as a combination of (i) targeted, new “hard” infrastructural adaptation measures as well as mainstreaming climate change into other infrastructural developments, (ii) risk management and coping strategies which rely on mainly the “soft” sectors and measures, like the bank/insurers, legislation schemes, governance and institutional transitions,



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transitions in spatial planning, and (iii) opportunities for technological, institutional and societal innovations

Both knowledge programmes aim to generate internationally competitive scientific results. At the same time, a major goal of both programmes is to enhance joint-learning between science and practice in coping with climate issues in local, regional and (inter)national developments, both in public and private domains. Both programmes recognize that the benefits of climate research arise from direct engagement and applications by the stakeholders. Governmental organizations (central government, provinces, municipalities and water boards) and businesses, actively participate in research projects.

A special feature of both programmes are so called hotspots: places or regions where science and practice meet and collaborate during the entire cycle of a project, from its definition phase through to its execution and final valorization of outcomes in terms of prototyping and implementing climate proof solutions. Hotspots are chosen based on (i) economic importance and the importance of the investment agenda, (ii) expected impact of climate change, (iii) ambitions relating to innovation and adaptation and (iv) national and international transferability. In order to ensure that research activities are demand-driven, a mixed team from the local authorities and business and science communities is put together for each hotspot project. Selected hotspots include major infrastructural and economic pillars of the Netherlands, such as

Schiphol Mainport and the Port of Rotterdam. “Climate *changes Spatial Planning*” (CcSP) and “Knowledge for Climate” focus on exploiting new adaptation strategies in the Netherlands to alleviate negative effects due to climate change and climate variability and at the same time support sustainable use of our space. The programmes aim at implementing an integral approach where science, governmental organizations and private companies jointly invest and operate to develop adaptive strategies supported by high quality technology. These guiding principles and initial results of our research have already found their way into some of the major strategies and decisions on future infrastructure of the Netherlands<sup>[3]</sup>.

In this brochure, a small selection of our projects and some results are presented. We welcome and encourage the reader to visit our webpages to learn more about our programmes, or to contact us for more information.

1] Hurk, B., van den, A.K. Tank, G. Lenderink, A. van Ulden, G.J. van Oldenborgh, C. Katsman, H. van den Brink, F. Keller, J. Bessembinder, G. Burgers, G. Komen, W. Hazeleger and S. Drijfhout, 2007. New climate change scenarios for the Netherlands. *Water Science & Technology* Vol 56 No 4, 27–33  
2] Kabat, P., P. Vellinga, J. Aerts, J. Veraart, and W. van Vierssen, 2005. Climate proofing the Netherlands. *Nature*, 438, 283-284  
3] Kabat, P., L.O. Fresco, M. Stive, C.P. Veerman, J.S.L.J. van Alphen, B.W.A.H. Parmet, W. Hazeleger, and C.A. Katsman, 2009. Dutch coasts in transition. *Nature Geoscience*, 2 (7), 450-452