Recommendations for a Research Agenda at PAUWES: Scientific Contribution to the Agenda 2063 of the African Union

- Climate Change -

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PAUWES

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Strategic domains

- Climate Modelling
- Vulnerability Assessment
- Adaptation, Mitigation
- Risk Assessment

Recommendations for Future Research Fields

Climate Modelling

- ***Data gaps can be closed*** through satellite remote sensing products (rainfall: GPM and TRMM, temperature: MODIS and MERRA, soil moisture: SMAP, and evapotranspiration: MODIS) in combination with the gridded re-analysis data.
- ***Strengthen PAUWES' connections with major research institutions and data providing agen***cies (NMHSs, WASCAL, SASSCAL, ICPAC, ACMAD, SADC-CSC, AGRHYMET, ACPC, etc.) and collaboration with global climate centers such as ECMWF, UK Met office etc. to develop regional downscaled climate models.
- ***Long-term development*** of ***high-tech laboratories with efficient computers for regional climate modelling*** including research and practical training of Master students.
- ***Linkages between CC, CV and land use dynamics*** in terms of a combined effect on water and food security and vice versa, mobilising synergisms in designing strategies to cope with impacts from climate and land use changes on hydrological cycle and food chains.
- ***Advanced Masters and PhD programmes on CC science*** as a contribution to develop ***highly trained climate scientists from Africa*** to foster high-quality research.

Recommendations for Future Research Fields

Adaptation Research

- ***Impact assessment studies on CC & CV and land use changes on the hydrological cycle*** as the basis for development of adaptation scenarios.
- ***Quantifying and reducing the uncertainties in CC scenarios***, performing impact assessment from regional to local scales and providing service for large-scale decision-making also with local communities.
- ***Improving understanding of key processes, feedback and drivers relevant for CC in Africa*** (utilising the competitive advantage of PAUWES/PAU due to networks and links to policy institutions).
- ***Research on "Policies and Institutions"*** is needed for facilitating the implementation of adaptation strategies (creating an *"enabling environment"*); its internal structure (engineering and policy lines in water and energy) and the link to other PAU hubs put PAUWES in an advantageous position to refine this (inter-/transdisciplinary) research.
- ***Strengthen internal linkages with Masters and PhD programmes within PAUWES*** and ***intensifying external networking*** with national and international organisations on adaptation research.

Recommendations for Future Research Fields

Mitigation Research

- Deriving ***options to interlink adaptation and mitigation strategies*** in order to optimise short up to long-term effect on coping capacities based on an improved understanding of the impact and interplay of these strategies.
- As mitigation measures can especially achieve a high effect in the energy sector, PAUWES potentially is in an advantageous position by ***utilising the nexus approach*** in combination with its competitive structure dealing with water and energy themes and being embedded in PAU's continental network.
- As a consequence, research activities towards ***mitigation should be closely linked with research aiming at the introduction of renewable energy options*** and also utilizing the ***network within the other PAU-hubs***; in addition, enhancing networking with global partners can be used to explore experiences on mitigation gained elsewhere and research activities at PAUWES could focus on how to modify mitigation strategies based on these global experiences for use in the African context.
- PAUWES, in cooperation with other African research institutions like ICPAC, ACMAD, SADC-CSC, AGRHYMET, WASCAL, SASSCAL, ACPC, etc., can initiate research on ***developing indigenous low-carbon emission technologies*** for sustainable water and energy management in Africa.
- ***Advanced Masters and PhD programmes on climate politics*** and global negotiations should be introduced in PAUWES in order to facilitate strengthening capacities of African actors towards effectively participating in international climate debates.

Recommendations for Future Research Fields

Risk Assessment

- ***Risk assessment should be guided by and streamlined into the research strategies in the water and energy domains*** (see sections: 2.1.and 2.2); PAUWES has competitive advantages towards realising these links or nexus, respectively.
- Application of comprehensive risk assessment methodologies, i.e. ***integrating natural and social sciences*** considering the root causes. Innovative tools (i.e. climate insurance schemes) could be elaborated and adapted to local and regional contexts.
- ***Developing methodologies to tackle situations with poor data base*** and to consider nexus contexts (case-by-casebased approach; refined tools and handbooks for risk assessment).
- Risk assessment research may have its home base at one of the PAU institutes, e.g. PAUWES, but should be considered as a ***cross-cutting activity relevant to the themes of all PAU institutes***.
- High-quality research on risk assessment in ***collaboration with the international research community***, particularly represented by the UNISDR Science and Technology Partnership (UNISDR 2015)4 which hopefully will become a platform for application-oriented international risk research and national and regional stakeholders for risk assessment (i.e. water and energy in case of PAUWES).
- Potential instruments and tools for implementation: ***African Risk Capacity Programme***