

Suggestions for future priorities for the German-Brazilian cooperation in Science for Sustainability

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All global challenges in the world base more or less in the growth of the world population. In few years 9 billion people will live on our planet, and the population will grow further. The growing world population will result in the increasing demand on all resources, and finally in climate change, increasing of epidemics, and mass migration and other consequences. Sustainable Development, therefore, must aim at giving our children and grandchildren the possibility to live in a livable world under conditions of social fairness, even under the general conditions of a growing world population. But this is not equivalent to a life in virgin landscapes.

From the point of view of applied research, Research and Development for Sustainability, globally and especially regarding German-Brazilian research cooperation should meet the most important challenges relating to the future:

- land use (food production, bio-energy, irrigation),
- water (water supply and sanitation, irrigation, hydropower, wastewater as a source of energy),
- renewable energy (bio-energy, solar energy, hydropower),
- biodiversity,
- transport and logistics.

Research and development in these fields should be performed interdisciplinary and comprehensive, considering interfaces of these sectors.

The water sector is tightly linked to all of the other research themes mentioned here. At a first superficial glance the situation in Germany and Brazil appears convenient. Both countries do not lack in Total Actual Renewable Water Resources (TARWR) and Brazil even appears to be very rich in renewable water. But in both countries the water resources are distributed unequally and irrigation does not matter in Germany yet.

If the data are reviewed more precisely it is obvious that the TARWR resources per capita decrease rapidly in Brazil (over 50 % in 50 years). This decrease is caused primarily by the growth of the population, by increasing water consumption per capita especially of the wealthy part of the population, by pollution of ground water and surface waters, and by the climate change.

Water supply and sanitation are not satisfactory especially in rural areas and for the low-income part of the population. 25 % of the total rural population is connected to water supply systems and 15 % is connected to sanitation systems. 70 % of the poorest part of the population has access to safe potable water and 40 % is connected to a wastewater collection system.

Therefore Research and Development for Sustainability in the water sector should focus on semi-decentralized water infrastructure systems for rural areas and small towns, cost-efficient water treatment technologies, anaerobic wastewater treatment and biogas production, water reuse, nutrient recovery from wastewater, and high efficient irrigation technologies, combined with education and training of people, scientists, engineers, technicians and administrative staff.

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<http://www.igb.fraunhofer.de/start.en.html>