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Hydrological modeling approach for sustainable use of water resources

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Human actions affect ecological systems and the services they provide through various activities, such as land use, water use, pollution and climate change. Climate change is perhaps one of the most important sustainable development challengesthat threaten to undo many of the development efforts being made to reach the targets set for the Millennium Development Goals. Understanding the change ofecosystems under different scenarios of climate and biophysical conditionscould assist in bringing the issue of ecosystem services into decision making process. Similarly, the impacts of land use change on ecosystems and biodiversity have received considerable attention from ecologists and hydrologists alike. Land use change in a catchment can impact on water supply by altering hydrological processes, such as infiltration, groundwater recharge, base flow and direct runoff.A conceptual framework is being developed which integrates climate change scenarios and the biophysical conditionsinto a hydrological model in order to assess its impacts on the socio-hydrological dynamics of a river basin and subsequently on the use of water resources. The first phase of this research was to setup SWAT hydrological model and to test its applicability in simulating the impact of a rainwater harvesting technique on the optimum use of water in agriculture. The result shows that conjunctive use of rainfall and irrigation could save a significant amount of water which could be made available for alternative use and contribute to increased water productivity.The model also showed the impact of this rainwater harvesting practice on surface and ground water components of catchment water balance compared with the conventional land use systems.

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