Where will be allocated the new irrigated lands under global change ?

a. pastor (1), l. ludwig (1), h. biemans (1), e. stehfest (2), and p. kabat (1)

(1) Wageningen University, Earth system sciences and climate change, Netherlands (amandine.pastor@wur.nl), (2) PBL, environmental agency, Bilthoven, Netherlands

By 2050, 9 billion people will be fed through an increase in rain-fed and irrigated agricultural land. The increase in water consumption will be the biggest challenge facing humankind. At the same time, climate change will disrupt the global water resources via changing precipitation and runoff patterns. It is fundamental to know how these changes in the food and water supply will occur, particularly when terrestrial and freshwater ecosystems are already degraded. We will study how and where new irrigated lands will be expanded with the coupled model LPJ-IMAGE. This model will allow us to predict the combined impact of climate change and land use change on water availability. Therefore, we will implement an environmental flow (EF) module into the Digital Global Vegetation Model (DGVM) LPJml. Allocation of water for freshwater ecosystem will be defined by assigning a high flow (HF) and a low flow (LF) to respond to freshwater ecosystem requirements following the Smakthin method (2004). So far, EF has been disregarded by the international water resource planners, which have mainly focused on managing "blue water" as the most efficient input in agriculture. We will use the LPJ-IMAGE modelling system to study possible expansion of irrigated lands. To do this, it is important to quantify the minimum estimated flow which is needed to sustain ecosystem functioning. Hence, by limiting water attraction with the inclusion of environmental flow, we will substantially improve the estimates of future water availability.