

Design and Implementation of IWRM in Vietnam

Examples of Climate and Land Use Changes

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Introduction

The German-Vietnamese joint R&D project „Integrated Water Resources Management Vietnam“ (IWRM-VN) funded by the German Federal Ministry of Education and Research (BMBF) is developing a Planning and Decision Support System (DSS) on a regional scale. The DSS includes methods for the aggregated evaluation of Water Demand and Use, Water Resources and Contamination Potential. These components are evaluated and aggregated into maps and reports. External Pressures (e.g. Climate Change, Land Use Change) influencing the IWRM process have to be considered.

Part Projects

The project IWRM-VN is conducted on the example project areas Nam Dinh province (Red River Delta, northern Vietnam), Lam Dong province (Dong Nai River Basin, central Vietnam) and Can Tho City (Mekong Delta, southern Vietnam).

The following content highlights the External Pressures “Climate Change” on the Mekong Delta and “Land Use Change” on the Dong Nai River Basin.



Mekong Delta

The Mekong Delta is located in the south of Vietnam. The delta extends over an area of approximately 40,000 km². The land elevation is almost 50 - 100 cm above sea level. A dense river and canal network is covering large parts of the delta. Also known as the “Rice Bowl” of Vietnam the Mekong Delta is the country’s most important rice cultivation area.



Dong Nai

The upper Dong Nai River Basin is located in the southern-central highlands of Vietnam. The region covers an area of about 15,000 km². The basin is characterized by large shares of agriculturally used land. The area is the agricultural and hydro-electrical growth centre of the south and is showing a dynamic socio-economic development.

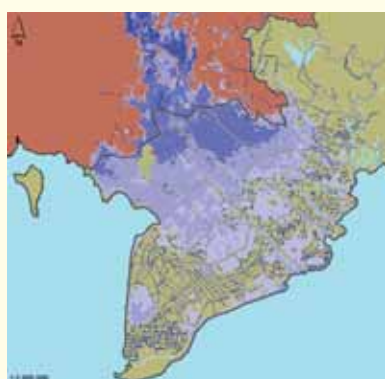


Fig. 1: Flood depth in year 2000
0 cm sea level rise (current state)
(light to dark: 0 m - 10 m)
(To Quang Toan, SIWRR 2009)

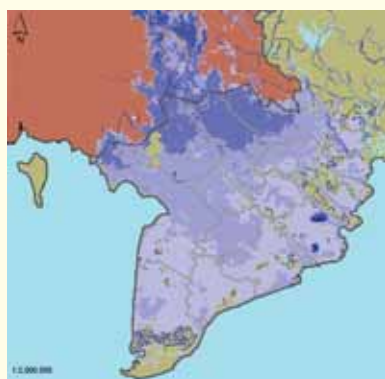


Fig. 2: Flood depth in year 2000
50 cm sea level rise (scenario)
(light to dark: 0 m - 10 m)
(To Quang Toan, SIWRR 2009)



Fig. 3: Flood depth in year 2000
100 cm sea level rise (scenario)
(light to dark: 0 m - 10 m)
(To Quang Toan, SIWRR 2009)

Climate Change (Mekong Delta):

Climate Change leads to a world-wide sea level rise. The most conservative projections for south-east Asia feature a rise of approximately 40 cm by the end of the 21st century. The results of the model (To Quang Toan, SIWRR 2009) displayed on the left take the current state (fig.1) as a basis for flood-scenarios at 50 cm (fig. 2) respectively 100 cm sea level rise (fig. 3) in the base year 2000. The consequences are an increase of the mean flood depth, duration and extent of the flood. The most negative effects are a loss of agricultural and settlement areas, a degradation of water quality and the destruction of infrastructure (e.g. water supply, transportation). Another consequence of the sea level rise is the expansion of the coastal salt water intrusion and concentration.

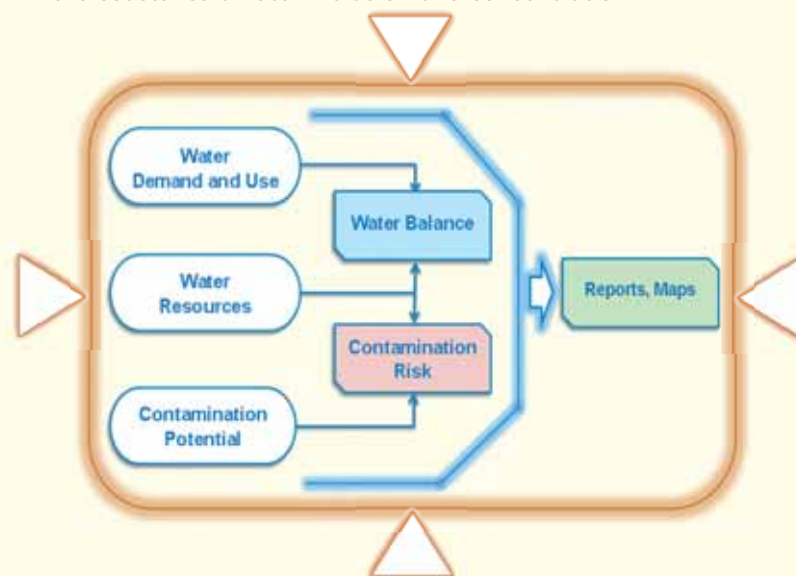


Fig. 4: Forest (green), Agriculture (brown), Water areas (blue) in year 1990



Fig. 5: Forest (green), Agriculture (brown), Water areas (blue) in year 2002



Fig. 6: Forest (green), Agriculture (brown), Water areas (blue) in year 2008

Land Use Change (Dong Nai):

Due to the dynamic socio-economic development and migration a rapid growth of the agricultural sector in the central highlands has been initiated during the last 20 years. This led to an intense process of Land Use Change from natural primary forests to agricultural used land.

The figures 4 to 6 on the right side of this poster show a significant decrease of forest area and an increase of agricultural used land during the last 20 years (see table).

Land use /year	1990	2002	2008
Forest	58 %	50 %	40 %
Agriculture	38 %	46 %	56 %

Consequences of the Land Use Changes are an increase of the irrigation demand, a higher ground- and surface water pollution load (pesticides and fertilizers), higher soil degradation and a change of the hydrological system in the River Basin.

Conclusions

Why is it necessary to consider the External Pressures within the IWRM process?

External Pressures affects all stakeholders and factors of the IWRM process. They are multi-temporal, multi-spatial and multi-sectoral and ...

- are an important factor in the scenario development concerning the future Water Demand and Use, Water Resources and Contamination Potential (e.g. growth of the agricultural sector).
- have to be considered when adopting the Water Management to future changes regarding ground water and surface water quantity and quality.
- require the development of a sustainable Land Management (e.g. implementation of reforestation and water protection measures).



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