



**The ViWa Model**  
Application of the virtual water approach for concrete  
development aid projects

# The ViWa Approach

- Simulates possible ways to cultivate the current arable land
- The simulated results are evaluated and the potential impacts on exports, GDP, income situation, unemployment rate will be calculated
- Results will also be analysed with respect to products that are needed in the region and to niche products in the European and global markets

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# ViWa Model

## Basics

Market value  
Land demand

Data from the FAO database are used to calculate the market value of and the land demand for the different agricultural products.

Water input

On a national level: Virtual water\* input calculation by Hoekstra (Report No. 16)

On a regional level: in co-operation with the Potsdam Institute for Climate Impact Research (PIK) and the University of Potsdam (LPJ model: virtual water contents of different plant / crop functional types for given climates)

\* Virtual water is the water embedded in the product

Water efficiency

Virtual water efficiency by Treitler (2005): efficiency is defined as a virtual water content that is below world average (i.e. wheat: below 1334 m<sup>3</sup> per ton)

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# ViWa Model

## Philosophy

- Water efficiency
  - the efficiency is used for the **DESCRIPTION** of a market situation
  - it is **NOT EVALUATING** a market (whether a market is good or bad)
  - an inefficient market situation needs different actions than an efficient market situation
  - the virtual water efficiency approach is a **COMPLEMENTARY** approach to the technical / infrastructural activities that are already applied to improve the water efficiency on a local or regional level

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# ViWa Model

## Philosophy

- Simulation

- the model is simulating different market situations

- **INCREASING** the share of water **EFFICIENT PRODUCTS** and/or
- substitution of water inefficient products with efficient products
- keep the **LAND DEMAND STEADY**
- **INCREASING** the regional / national **MARKET VALUE** of agricultural products
- keep the **EMPLOYMENT RATE STEADY**
- substitution of inefficient products only possible within 11 defined product categories (i.e. cereals, vegetables, fruits etc.)
- output should be a **RANGE** of **POSSIBLE SOLUTIONS**

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## Output

- **National production (NP):** List of water efficient and inefficient agricultural products on a local or national level
- **Regional production (RP):** List of products that are produced inefficiently in the targeted country but efficiently within a region (neighbouring countries) or within a climatic zone (in different regions)
- **Alternative production (AP):** List of products that are not produced in the targeted country but that are produced efficiently within the region (neighbouring countries) or within a climatic zone (in different regions)

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## Output – Example Mali

- List of water efficient and inefficient agricultural products on a local or national level

current products	
efficient	inefficient
Cow Peas, Dry Mangoes	Wheat Rice, Paddy Maize Millet Sorghum Fonio Cereals nes Sweet Potatoes Cassava Yams Sugar Cane Bambara Beans Pulses nes Nuts nes

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# ViWa Model

## Output – Example Mali

- List of water efficient products on a regional level (neighbouring countries / climatic zones)

regional efficient	
inefficient in the country	country
Millet	Côte d'Ivoire
Sorghum	Algeria
Fonio	Guinea
Cassava	Guinea-Bissau
Yams	Guinea

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# ViWa Model

## Output – Example Mali

- List of alternative water efficient products on a regional level (neighbouring countries / climatic zones)

alternative products	
products	country
Taro (Coco Yam)	Guinea
Cow Peas, Dry	Burkina Faso
Cashew Nuts	Côte d'Ivoire
Kolanuts	Côte d'Ivoire
Coconuts	Côte d'Ivoire
Carobs	Algeria

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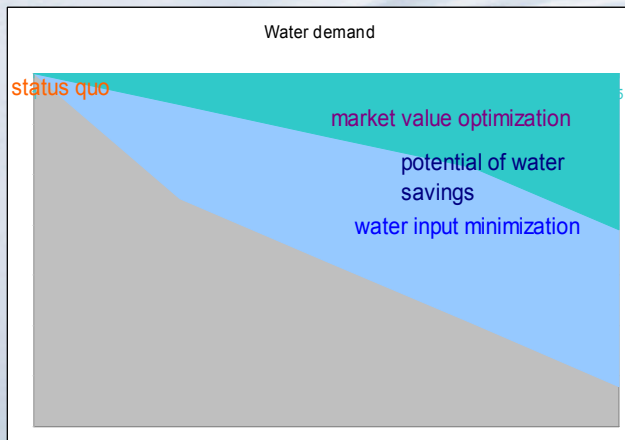
# ViWa Model

## Output - Example

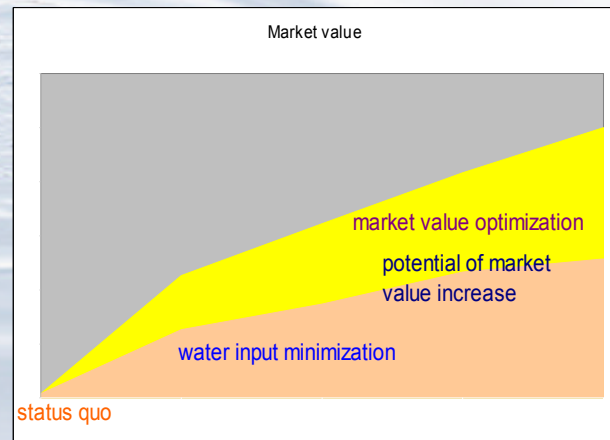
National production

(increase of the share of national efficient products to up to 3% of the world production)

- Potential of water saving



- Potential of market value increase



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# ViWa Model

## Output - Overview

- pictures of the results of the simulations
  - potential of the water savings
  - potential of the market value increase
  - development of income situation
  - development of employment situation
  - development of GDP
  - development of exports & imports
- analysis of the results
- recommendations

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# ViWa Model

## Aims of the model

- Generating a sound decision basis for :
  - Implementing the results in the national water strategies / plans
  - Implementing the results in the national agricultural strategies
  - Improving the income situation
  - Improving the economic development (exports)
  - Improving the national food security
  - SAVING WATER
- Building capacity

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For further information:

Roland Treitler

ExAqua Research (EAR)

Reckentragstraße 20

3300 Amstetten

Austria

Tel.: +43 67684 8048 500

E-Mail: [service@exaqua.at](mailto:service@exaqua.at)

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