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The Impacts of Water Management Policies on Agricultural Production in Australia

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-working paper-

My Country

“
...

*I love a sunburnt country,
A land of sweeping plains,
Of ragged mountain ranges,
Of **droughts** and flooding rains.*

“
...

Dorothea Mackellar
(1885 - 1968)



from: <http://www.dorothea.com.au>

Climate

- Drought and water scarcity → no sufficient adaptation
- Permanent overuse of water → unsustainable and unhealthy conditions of the Basin's rivers, wetlands and floodplains
- Climate change → 90 % chance of increasing drought conditions and substantially less precipitation

Agricultural Production

Australia is one of the biggest exporters of agricultural products in the world

2 meat-cattle boneless beef

2 raw sugar

3 wheat

5 wine

5 cotton

irrigated

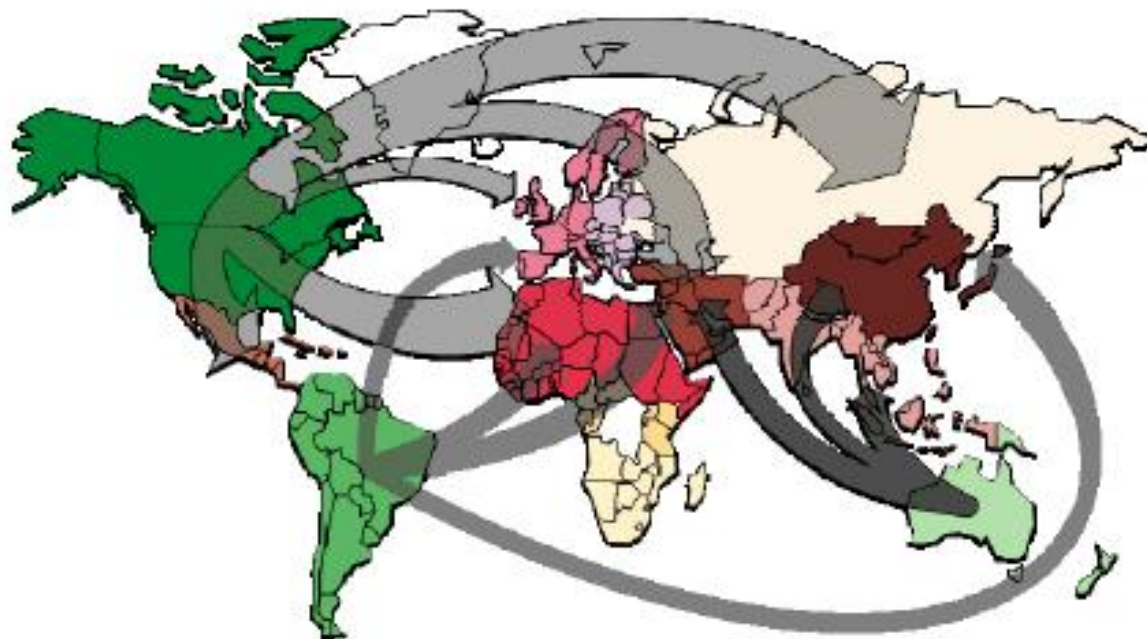
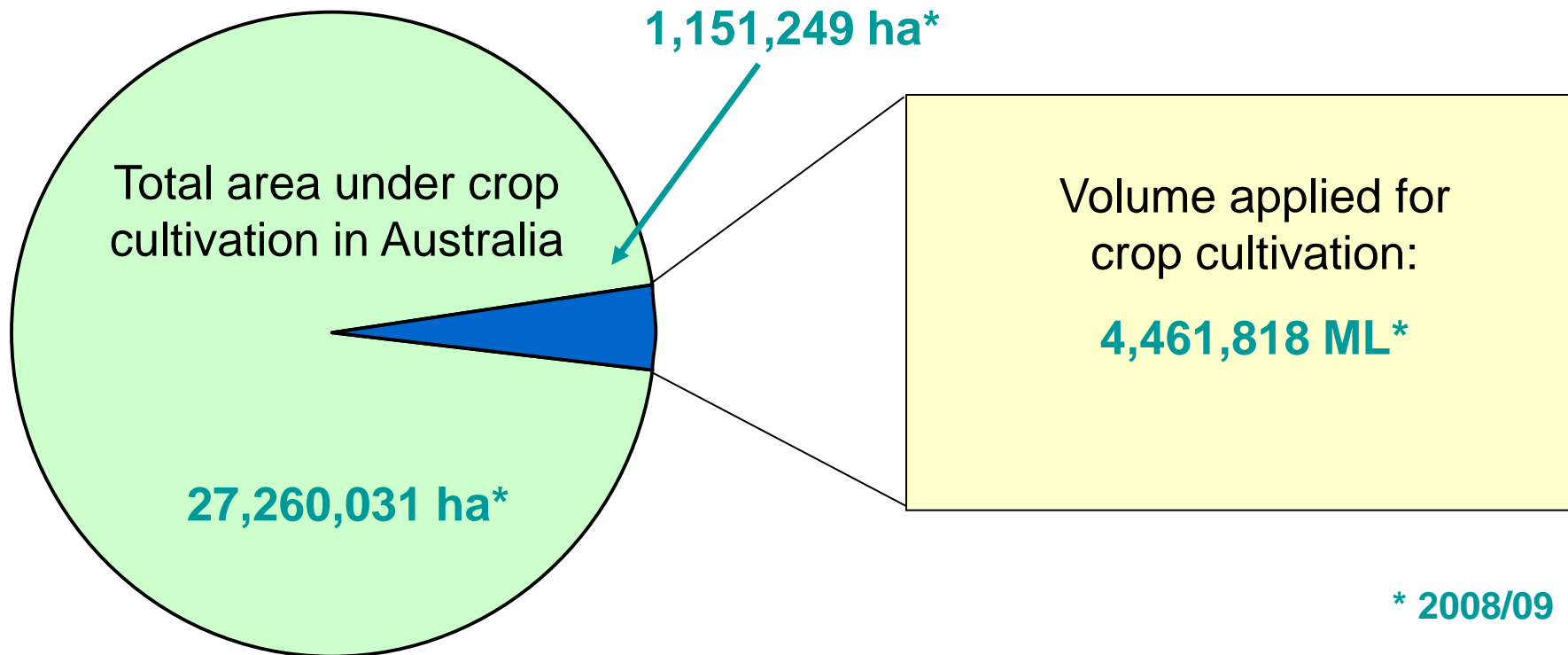


Figure: H. Yang et al., 2006

Agricultural Production

4.2 % of area under crop production is irrigated:

1,151,249 ha*



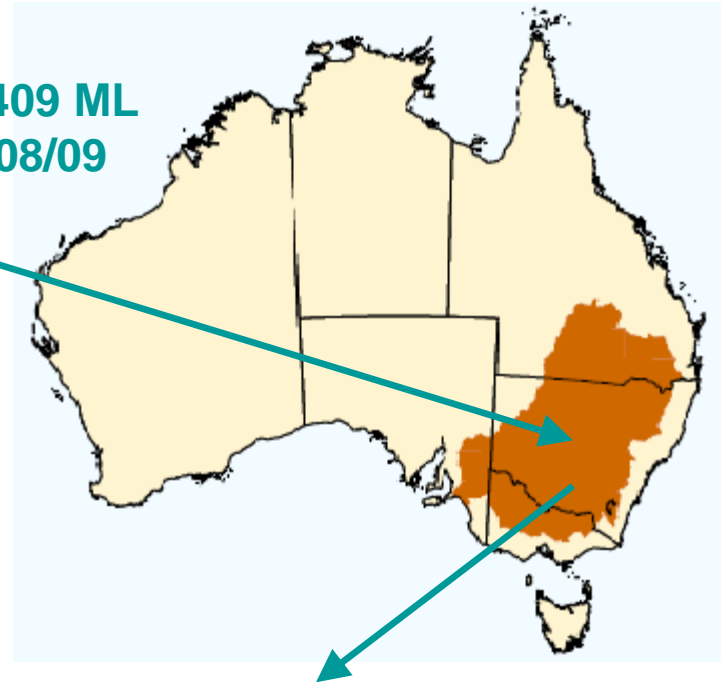
* 2008/09

Source: ABS, 2008. Water Use on Australian Farms, 2008-09

Agricultural Production



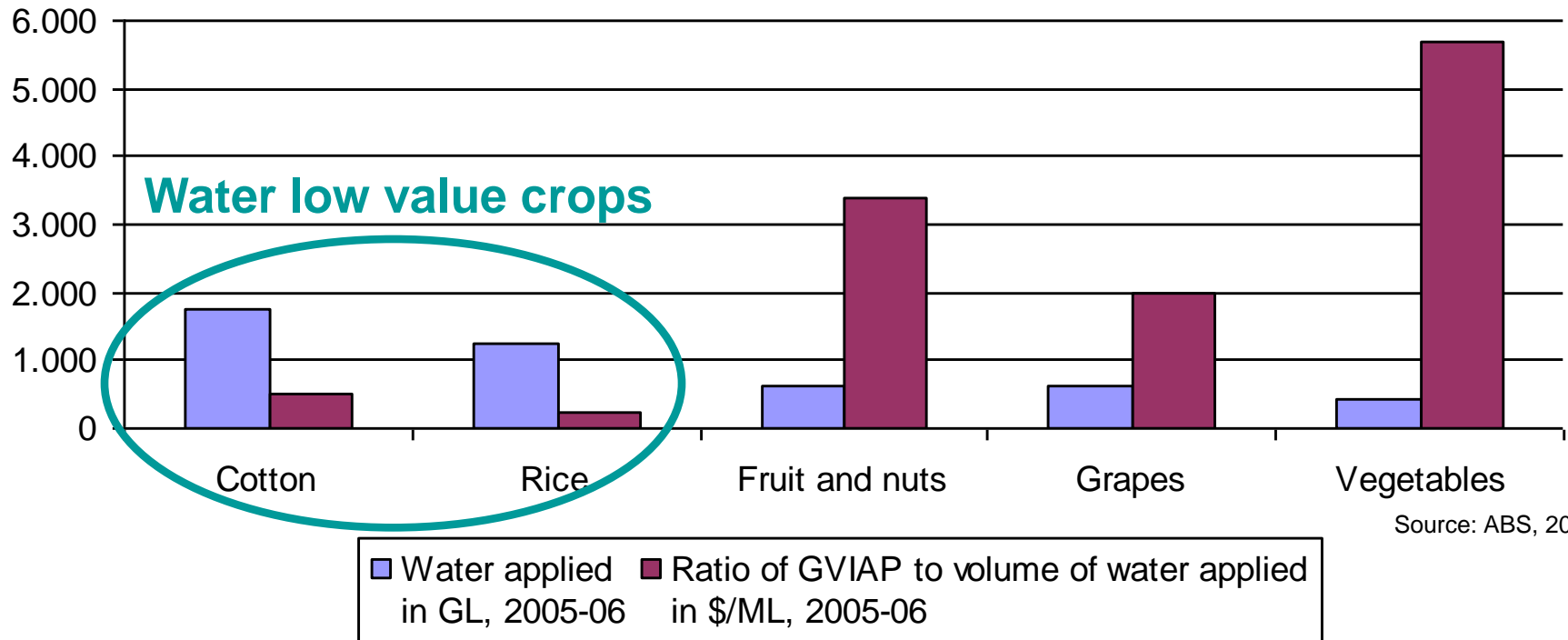
2,717,409 ML
in 2008/09



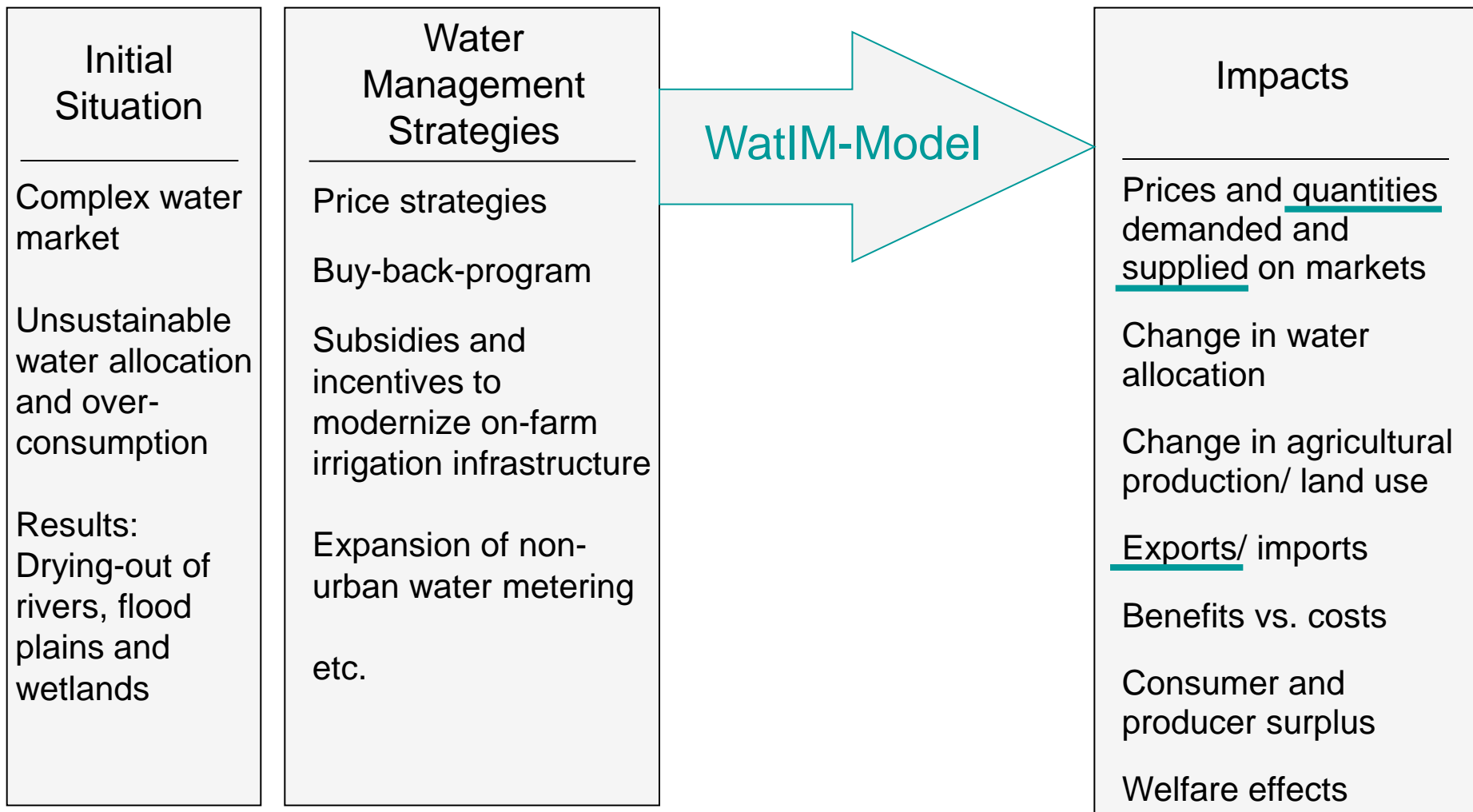
Source: ABS, 2008. Water Use on Australian Farms, 2008-09

- 100% of Australia's irrigated rice production
- 90% of Australia's irrigated cotton production
- 60% of Australia's irrigated grape production

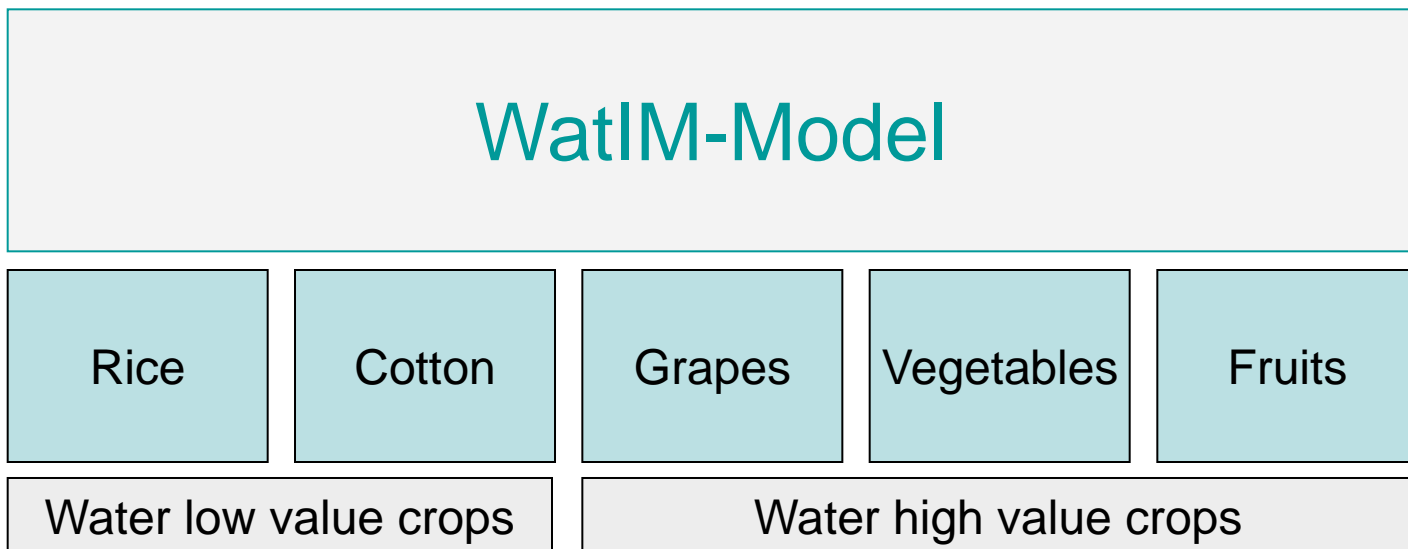
Irrigation water use and Ratio of Gross Value of Irrigated Agricultural Production (GVIAP) to volume of water applied (MDB)



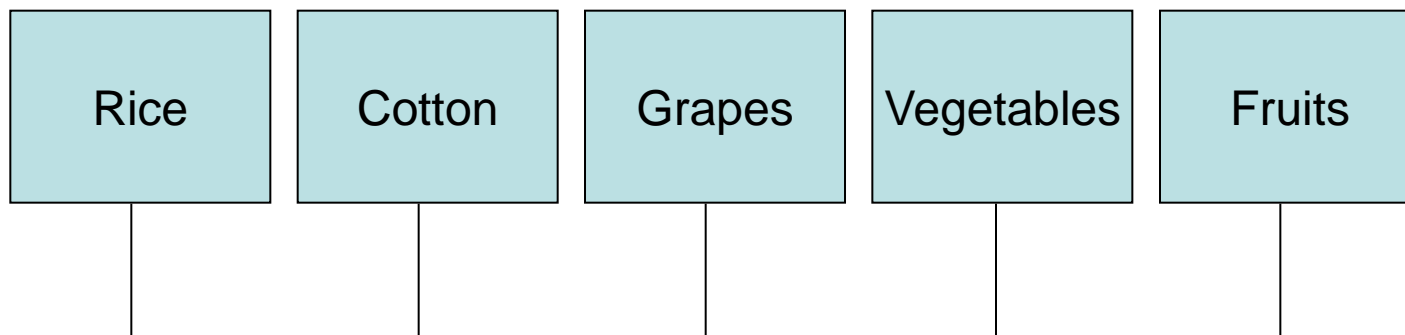
Water Management in the Murray-Darling Basin



Water Integrated Market (WatIM) - Model



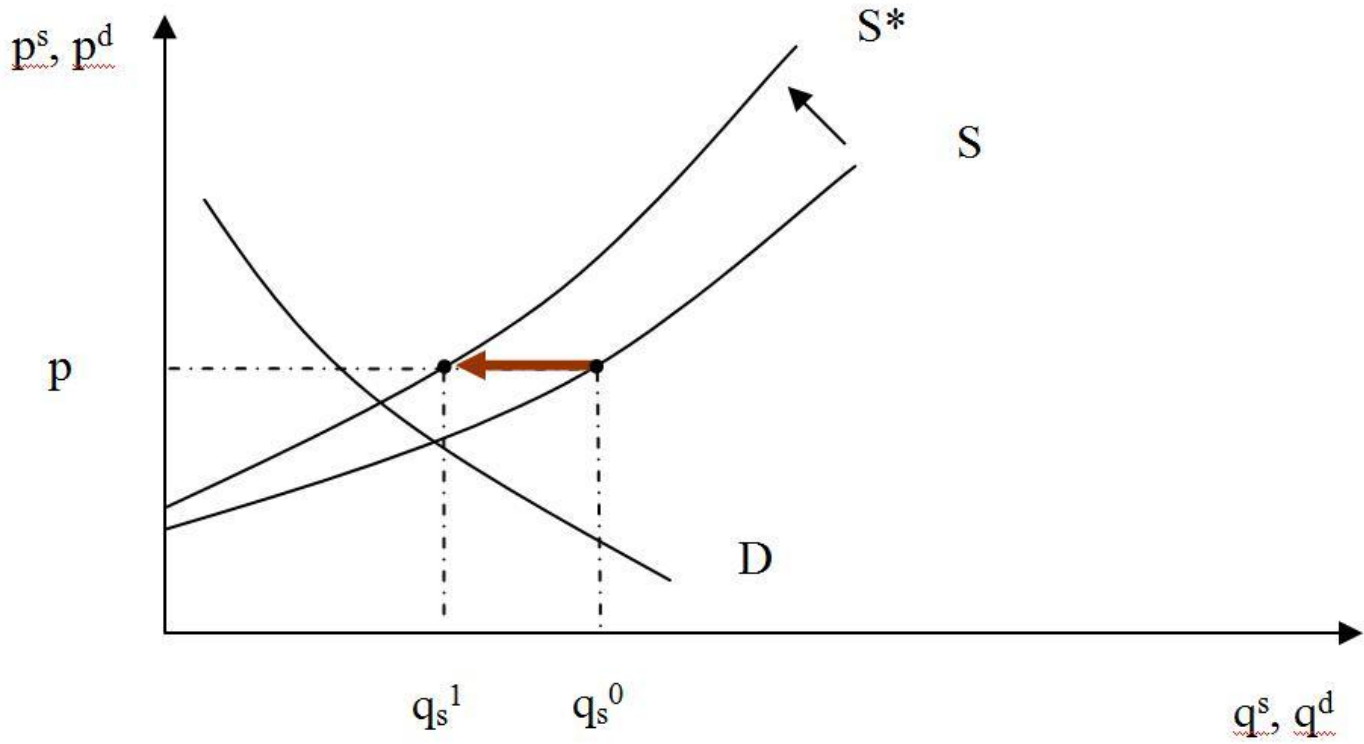
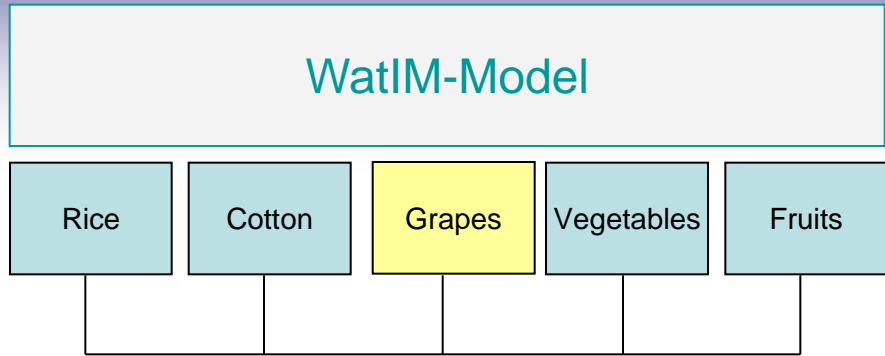
WatIM-Model



- Supply function
$$q_m^s(p_n^s) = a_m (1 + f) \prod_{m,n=1}^5 (p_{mn}^s)^{\varepsilon_{mn}^s}$$

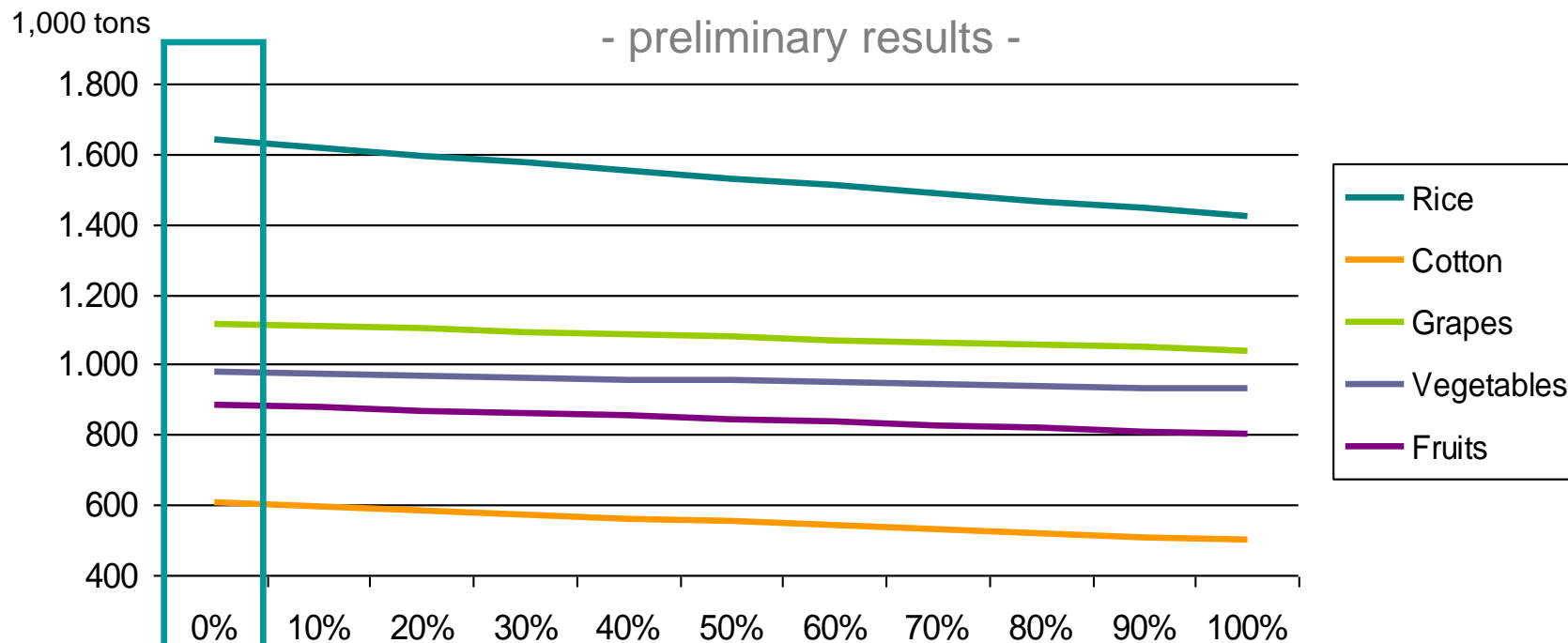
- Demand function
$$q_m^d(p_n^d, y) = b_m \prod_{m,n=1}^5 (p_{mn}^d)^{\varepsilon_{mn}^d} y^{\eta_m}$$

with $m, n = 1, \dots, 5$.



Source: Own illustration

Impacts of water price change on quantity produced

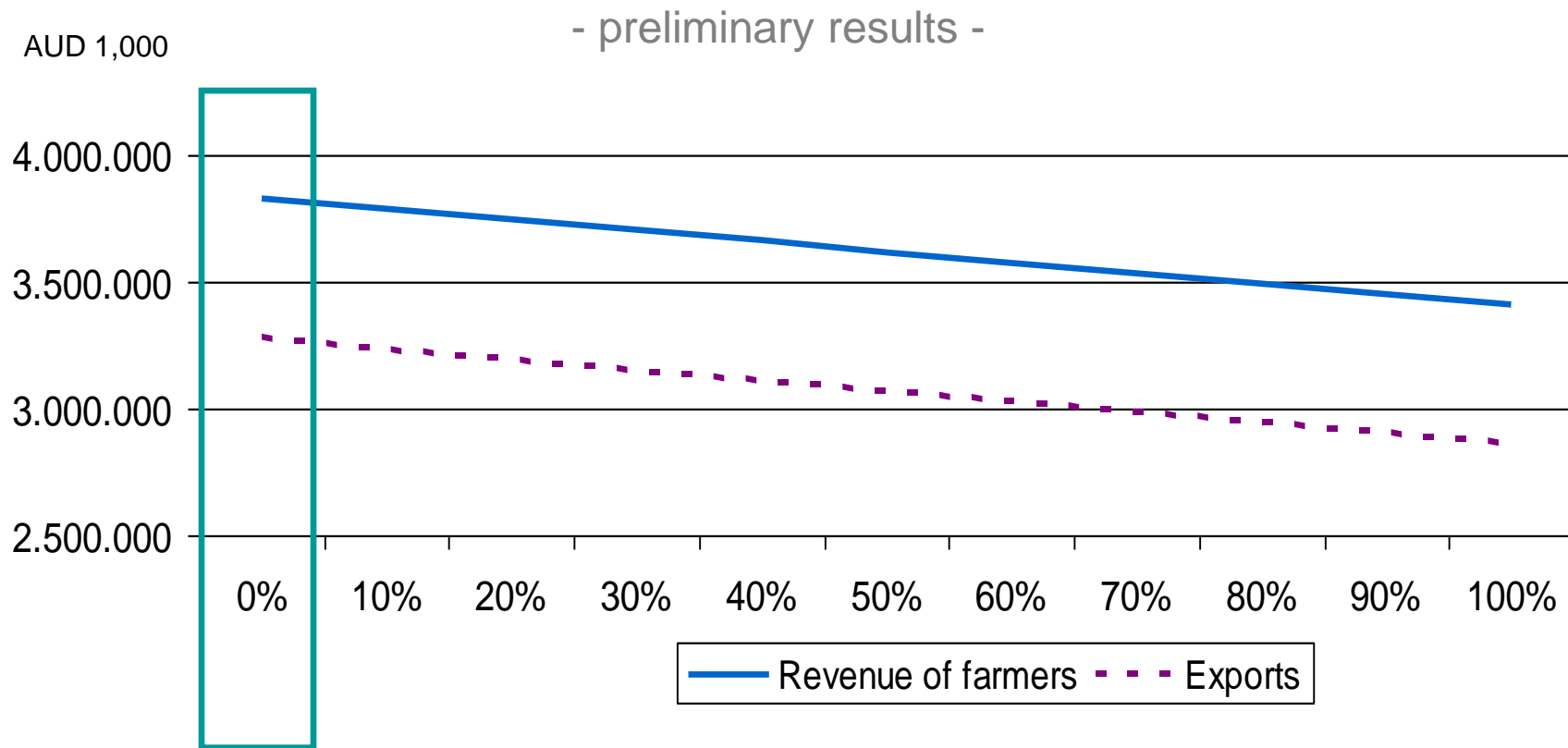


Initial value

\$115 /ML

Source: Own calculations

Impacts of water price change on revenue of farmers and exports



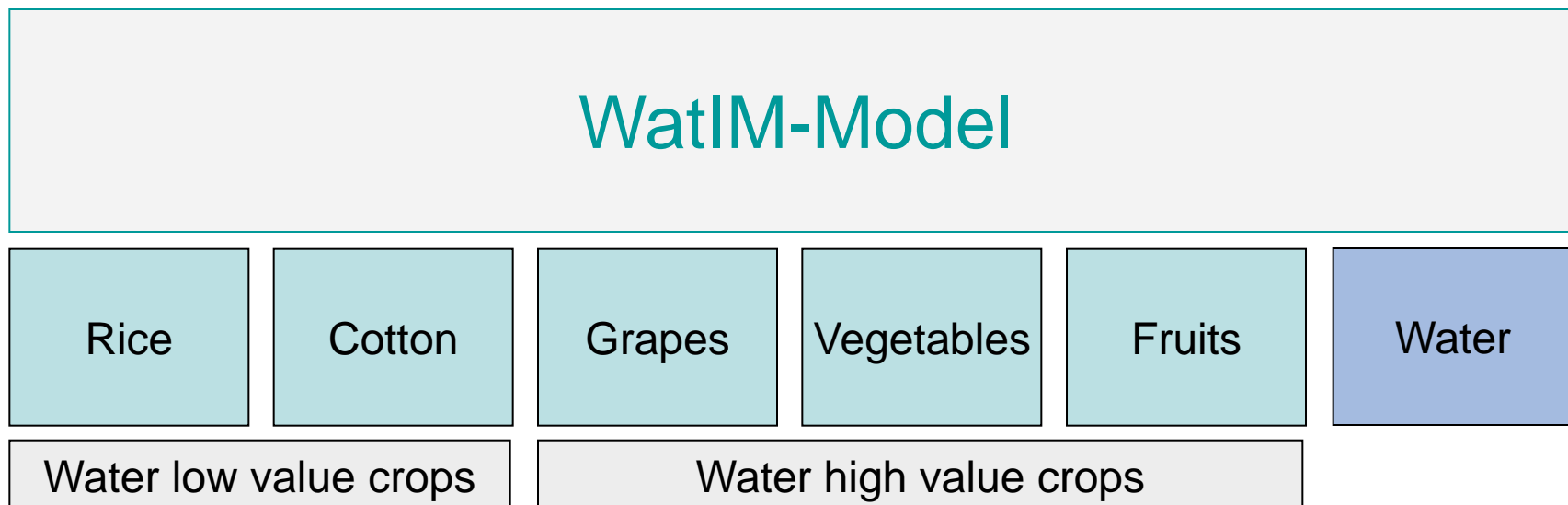
Initial value

\$115 /ML

Source: Own calculations

Further steps

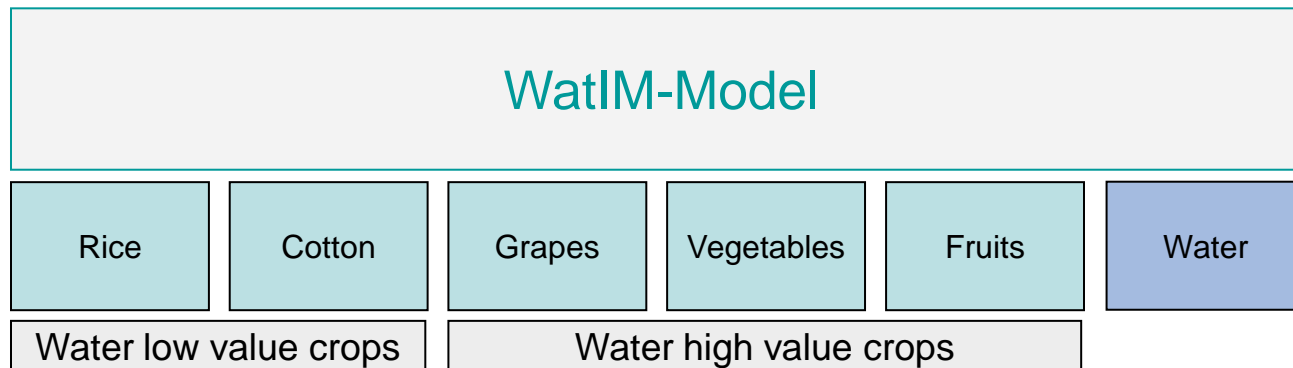
- Integrate water as the sixth market and as an input-factor into the model



Further steps

- Considering water rights and water trade
- Examination of other water management policies:
 - Limits of available quantities for irrigators
- Internalisation of external, environmental and social costs and periodic scarcity of water during droughts

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