Mahmood Ahmad Ph.D
FAO Consultant on Water Scarcity Initiative and Land and Water Days

POLICY ANALYSIS MATRIX

Assessing Land and Water Productivity and Agriculture Competitiveness

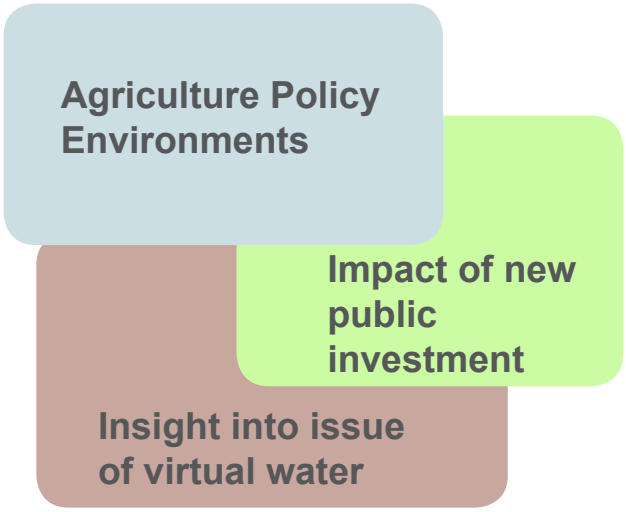
What is PAM?

Policy Analysis Matrix or PAM is a policy analysis tool based on a very simple and basic equation.

' Profit = Revenues – Costs'

- Estimation is based on private (financial prices) and social prices (economic).
- Mostly the divergence between two types of profitability comes from policy intervention.
- The analysis is often based on preparing full crop budgets, and the fact most price distortion are largely embedded in water ---- excellent tool to assess water productivity in physical and value terms and to assess allocative efficiency.

How PAM helps **policy makers** address three central **agricultural** issues ?



POLICY ANALYSIS FRAMEWORK

PAM estimates the competitiveness and farm-level profits (D)
Influence of investment policy on economic efficiency and comparative advantage (H)
Policy transfers, incentive or protectionist policy (L)

		Costs		
	Revenues	Traded Inputs	Domestic Factors	Profits
At Private Prices	A	B	C	D
At Social Prices	E	F	C	H
Divergence	I	J	K	L

Policy Indicators
Nominal Protection Coefficient (NPC) = A/E
Effective Protection Coefficeint (EPC) = A-B/E-F
Domestic Resources Cost (DRC) = G/E-F

PAM helps policy makers

Agriculture policy environment	*Impact of new public investment*	*Insight into issue of virtual water*
Measure the transfer effects of policies, is farming being taxed or subsidized?	Tradeoffs: Water productive efficiency versus allocative efficiency	Does investing in commodity has a comparative advantage
Weather farmers, traders, and processors earn profits. Comparisons of before and after the policy change measures the impact.	Successful public investment (in irrigation) would raise the value of output or lower the cost of inputs.	Approaches issue of food security (domestic production versus imports) in a scientific way

A simple tool, powerful to communicate with policy makers but DATA needs are large

FAO/RNE used PAM for supporting member countries in preparing agriculture strategies or policy review often with donor support (World bank, UNDP and others) for Egypt, Iran, Syria, Jordan, and Palestine. Policy review for Oman, Yemen, Kazakhstan and Kyrgyzstan.

Incentives & Efficiency

All four countries have tremendous comparative advantage in growing cotton, but other than Kyrgstan, all are taxing farmers as they are receiving 60 to 70 % of world cotton price.

FAO/RNE POLICY ANALYSIS CASES/ BREIFS

Egypt Cotton, 1998

Values Basis	Revenues	Cost of Production		Profits
		Tradable	Non-tradable	
Private	543.61	138.39	374.92	30.31
Social	889.23	168.43	422.32	298.48
Divergence	-345.62	-30.04	-47.40	-268.17
Coefficients	NPC = 0.61 EPC = 0.56 DRC = 0.59			

Pakistan Cotton, 1998

Values Basis	Revenues	Cost of Production		Profits
		Tradable	Non-tradable	
Private	232.91	99.66	122.66	10.60
Social	333.81	84.78	113.07	135.97
Divergence	-100.90	14.88	9.59	-125.36
Coefficients	NPC = 0.70 EPC = 0.54 DRC = 0.45			

Kyrgstan Cotton, 1999

Values Basis	Revenues	Cost of Production		Profits
		Tradable	Non-tradable	
Private	346.06	108.91	107.67	129.48
Social	355.9	119.16	112.83	123.91
Divergence	-9.84	-10.25	-5.16	5.58
Coefficients	NPC = 0.92 EPC = 0.97 DRC = 0.55			

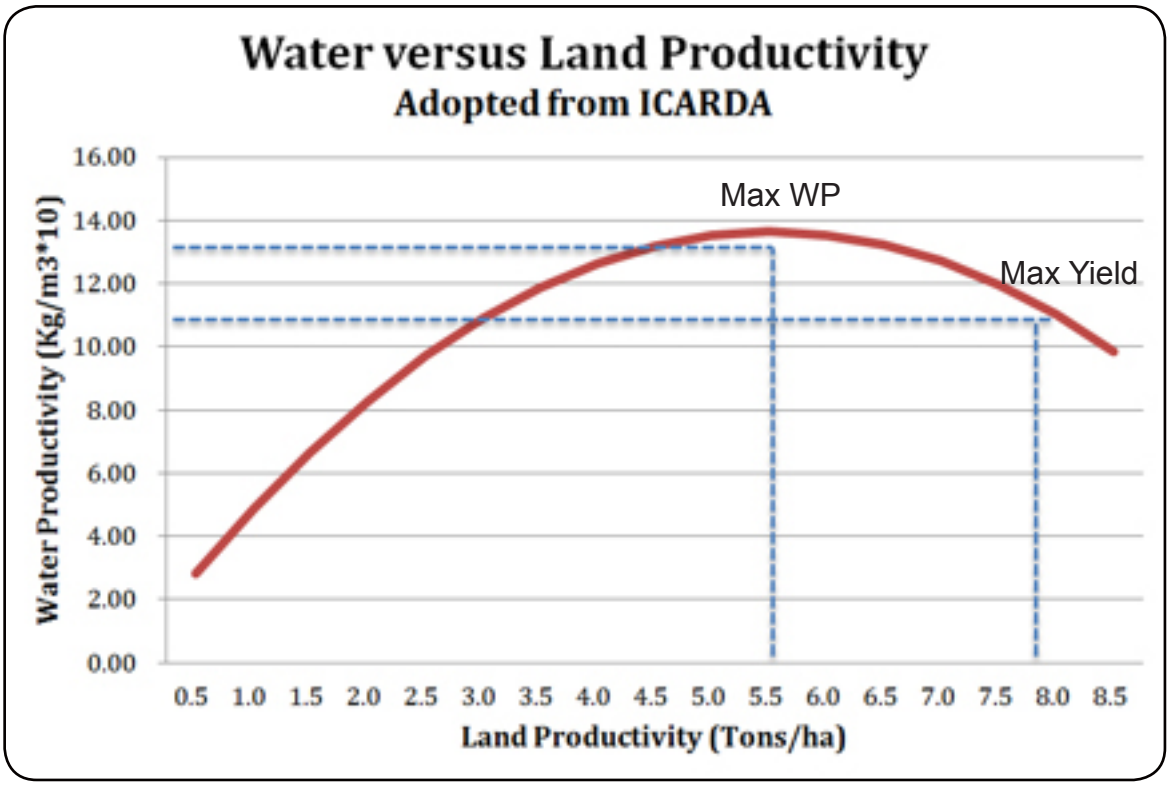
Tajikistan Cotton, 2001

Values Basis	Revenues	Cost of Production		Profits
		Tradable	Non-tradable	
Private	731.4	201.23	300.88	229.28
Social	790.52	246.06	303.32	241.15
Divergence	-59.12	-44.82	-2.43	-11.87
Coefficients	NPC = 0.61 EPC = 0.56 DRC = 0.59			

From Comparative to Competitive Advantage

"NENA Region has good comparative advantage in producing high value crops but needs to translate this to competitive advantage" -- Key finding in PAM Analysis

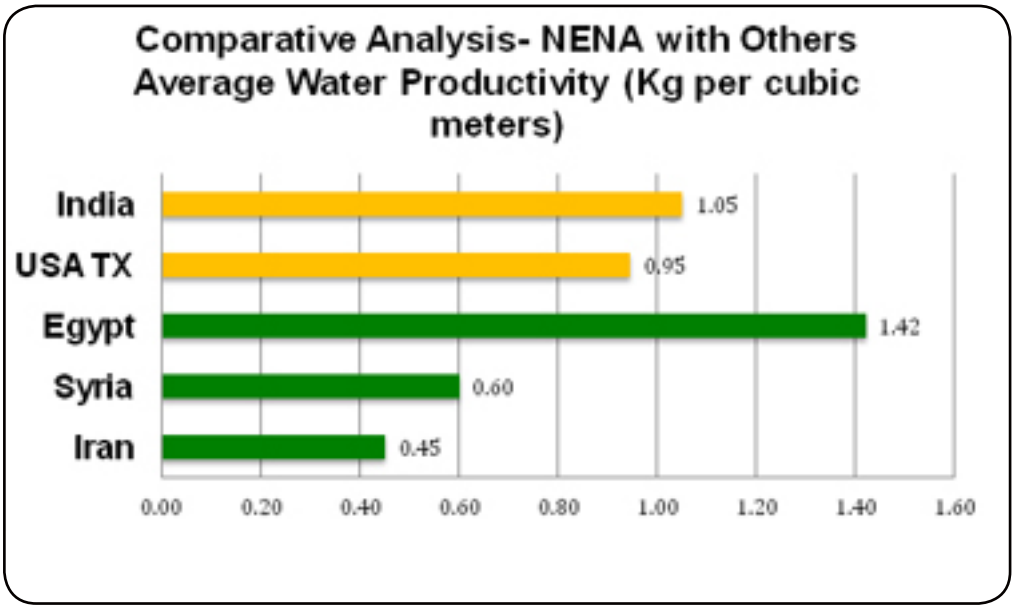
Factor-Driven Economy	**Investment Driven Economy**	**Innovation Driven Economy**
Low Cost Inputs: Labour, Natural Resources	**Efficiency Through Heavy Domestic and Foreign Investment**	**Unique Value**
Iran, Egypt, Morocco	**China,India, Turkey**	**USA, Japan, Korea**

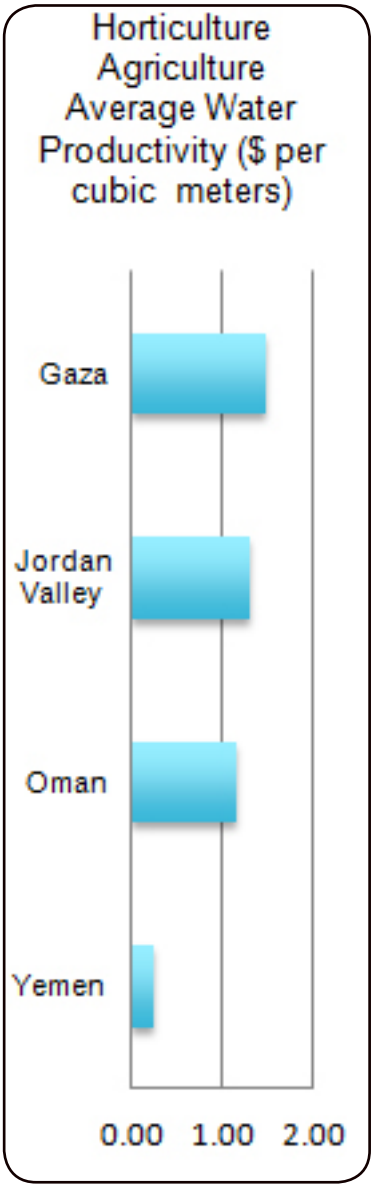


NENA REGION

FAO/RNE POLICY ANALYSIS CASES/ BREIFS

NENA region's water productivities are **higher** than global average but vary from region to region.





Wheat /Cereal Water Values Compared ($ per m3)			
Selected NENA Countries		Selected Non-NENA Countries	
Egypt	.51	India (Bhakara Canal)	.171
Iran	.0021	China (Yellow River)	.06-.29
Syria	.11	France (cereals)	.182

Relavant Quote: "Efficient water use will only become common practice when a strong consolidated water resources regulatory organization is in place to support compliance with the legal structure and there is a tariff schedule based on the true value of water. Stronger enforcement of laws and regulations can make a major contribution to relieving water shortages today" Water for Life, Jordan's Water Strategy 2008-2022

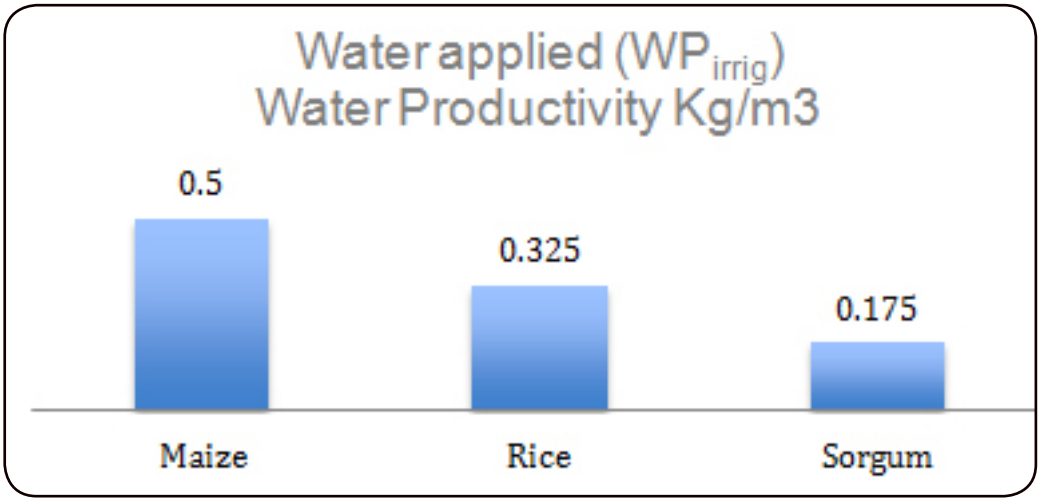
IRAN

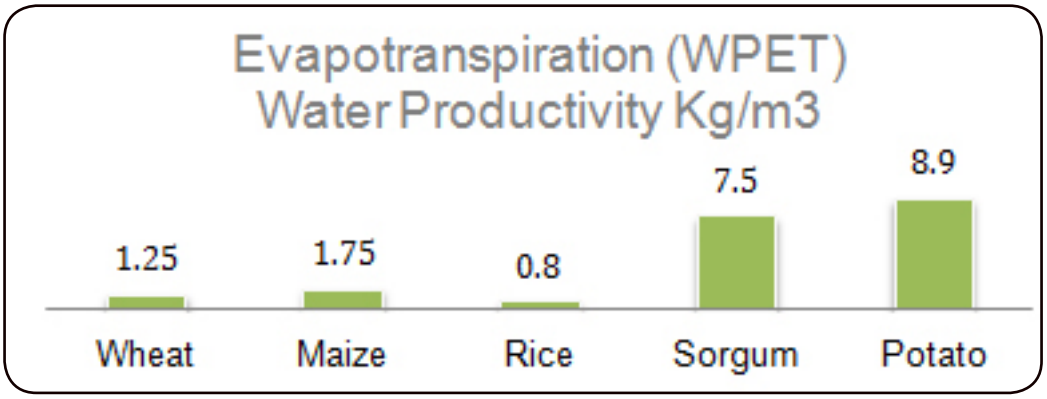
FAO/RNE POLICY ANALYSIS CASES/ BREIFS

IRAN Water Productivity $/m3, varies how we value nominator			
	Gross Revenue	**Gross Margin**	**Net Profit**
Wheat	0.007	0.004	0.002
Barley	0.006	0.003	0.001
Maize	0.006	0.004	0.002
Chickpeas	0.007	0.004	0.002
Sunflower	0.006	0.004	0.002
Cotton	0.010	0.006	0.003
Sugar beet	0.009	0.005	0.003
Onion	0.012	0.005	0.003
Potato	0.012	0.006	0.004
Spring soybean	0.006	0.004	0.001
Paddy LG/HQ	0.006	0.003	0.001
Paddy LG/HV	0.007	0.005	0.002
Paddy Short Grain	0.007	0.004	0.003

Water productivity has many dimensions.

Water productivity varies depending on how we budget water use (the denominator in the equation), the applied water or consumed water.



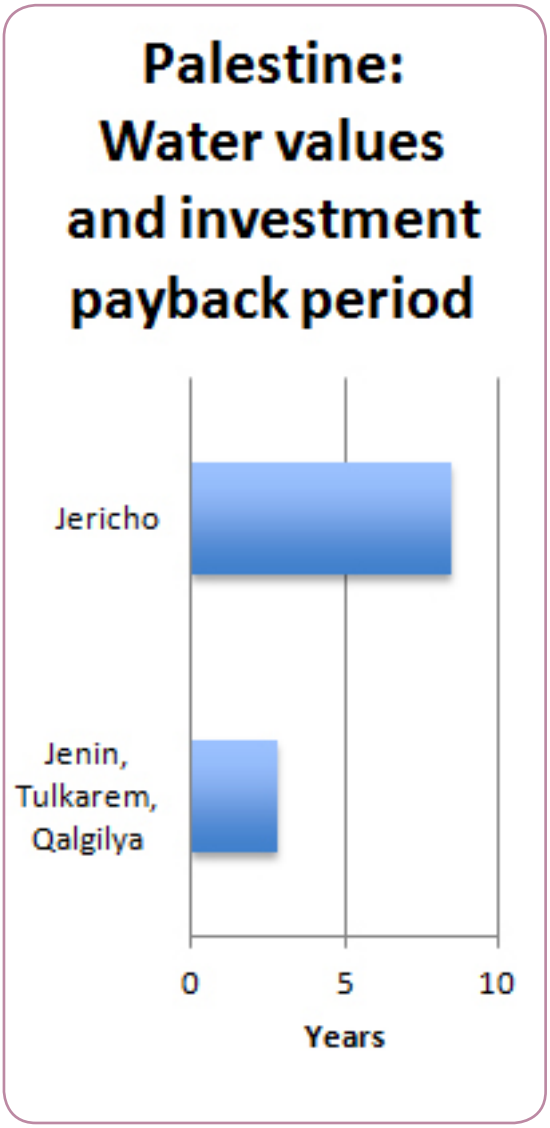


EGYPT/ PALESTINE

FAO/RNE POLICY ANALYSIS CASES/ BREIFS

Saving (values) of water determines the rate of return on investments. In Jericho (low water values) it takes 8.46 years as pay back time where as in high water values area (Jenin) it only takes 2.80 years.

Egypt SugarCane		
Policy Change - Investing modern technology		
	Before	After
Water use (cubic meters / fedan)	12000	9500
Yield (tons/fedan)	46.73	56.07
Cost of Improve-ment (Le /fedan)	0	194
Impact of Policy		
Profitabilty (Le/fe-dan)	1482	2129
Domestic Re-source Cost	1.07	0.81
Ahmad-Kieth (2002)		



Sugarcane

Better Irrigation Practices → Water Saving →

Enhanced profitability and with intervention the crop carries comparative advantage (DRC< 1)

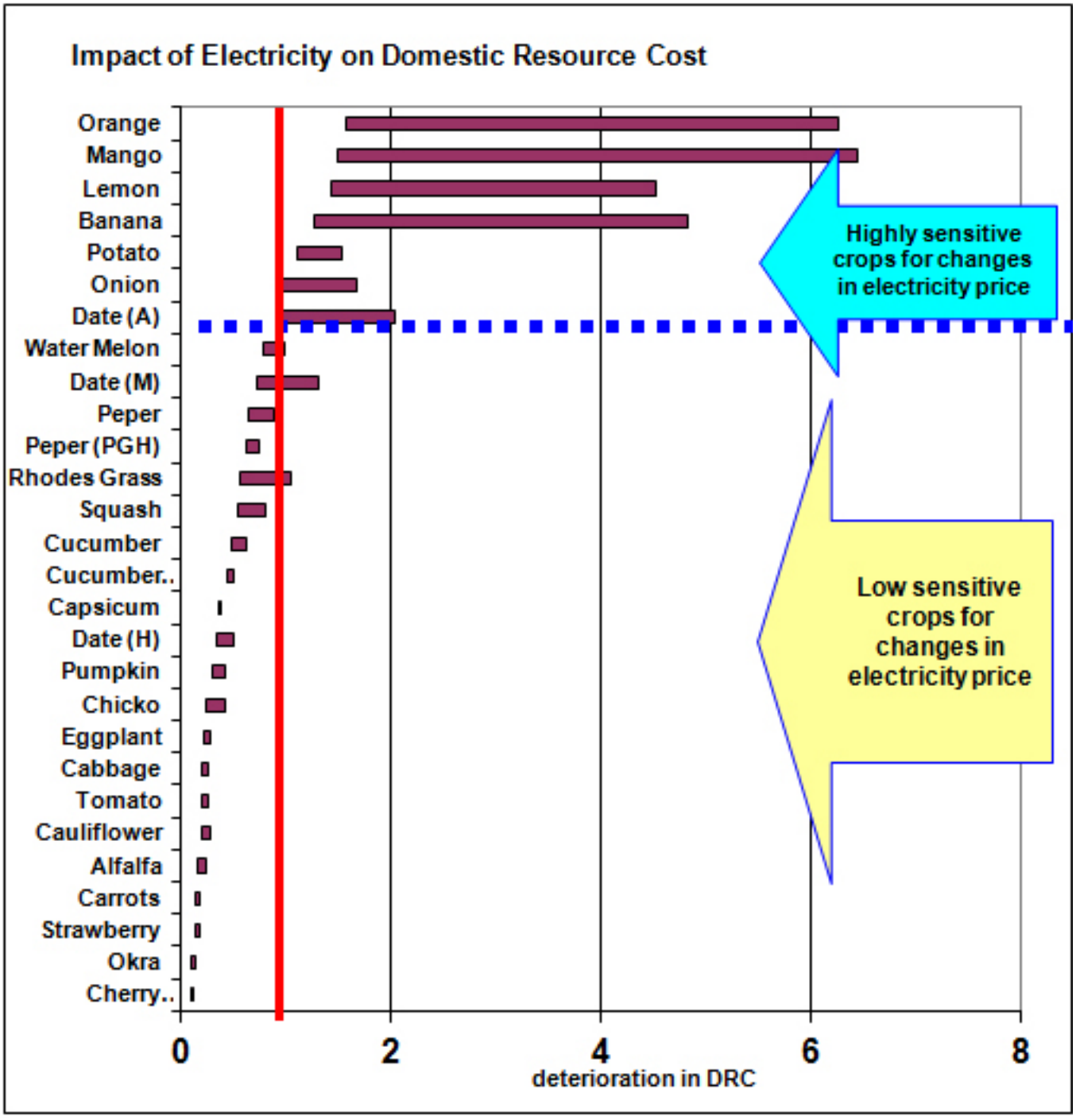
OMAN

FAO/RNE POLICY ANALYSIS CASES/ BREIFS

Water and energy subsidies entails misallocation of resources and environmental degradation

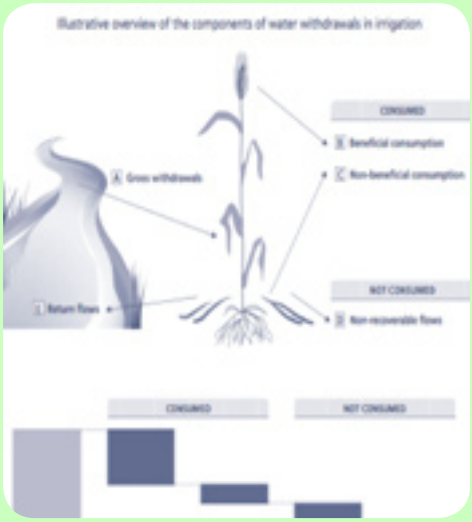
Our impact analysis of energy subsidy on domestic resource cost in Oman indicated (figure) that only few commodities would be economically feasible if subsidy is removed. The impact of energy subsidy on groundwater depletion in the region is well documented.

In energy deficient countries high energy cost results in farm income decline and also a decline in the competitiveness of agriculture sector.



Looking Forward

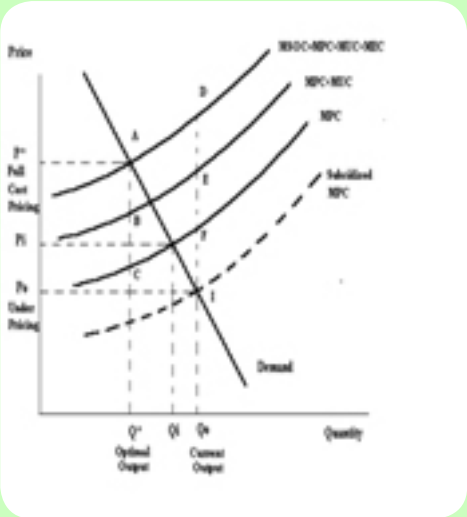
PAM a good framework for fact based policy advise, few key areas are ....



Agriculture has to produce more and better quality food with less water-enhancing water productivity is key

- Enhancing marketable yield of the crops for each unit of crop transpiration.
- Improve both productive and allocative efficiency of water use and making sure that water saving is real.

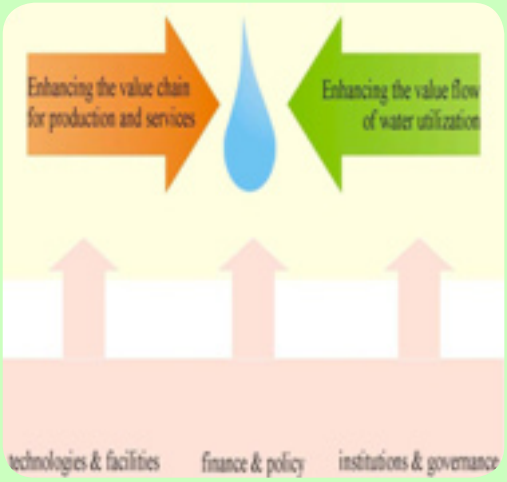
FAO 38,2012



Subsidies are widespread and distortionary

- The price of water is so low in the region that one needs a sizable increase to make an impact. A good option is to consider water allocation or entittlement as policy tool.
- The value of water in agriculture is also low, thus it is not attractive to invest in modern technology.
- Natural resource ownership is associated with open access. Create secure and implentable property rights to reduce envirnomental degradation.

Ahmad , 2000



We need to think and plan differently

Water to Markets: Develop profitable agriculture enabling farmers to upgrade technology and better afford increased water tariffs that more truly represent the value of water consumed.

We need to make small farmers inclusive in adoption of modern irrigation and improved rainfed agriculture.

Further farming needs to be competitive-add value all along the chain with farmers getting their due share.

Food losses are sizable - so much water embedded, an important source to save water.

Energy, water and food security nexus has growing bearing in designing policy options.

Joachim von Braun, 2012

* Globe Image courtesy of Danilo Rizzuti / FreeDigitalPhotos.net