

International Conference on  
Water Security

Tashkent, 13 May 2011



MARSEILLE, FRANCE '12

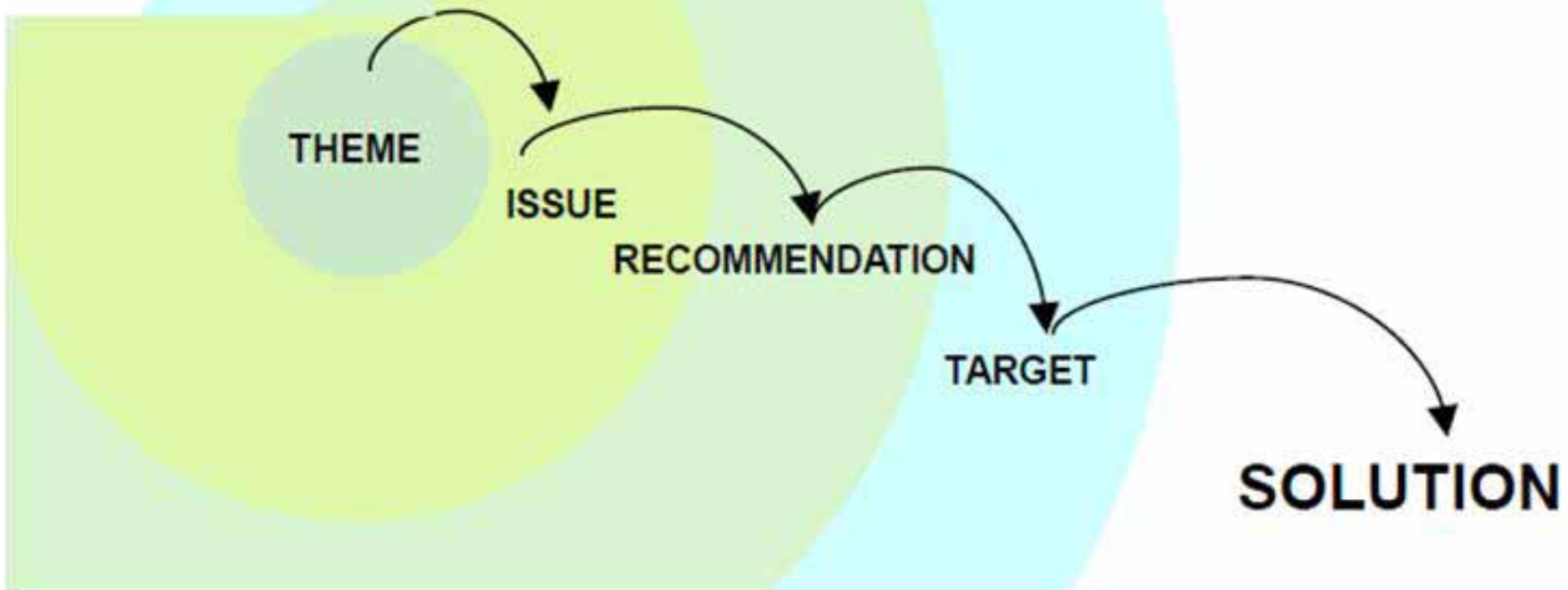
# TOWARDS WORLD WATER FORUM 6: COOPERATIVE ACTIONS FOR FOOD SECURITY

Partnering with FAO, ICID's ongoing consultations within  
the organization on Thematic Forum topics relating to  
Global Food Security & Water

**M. Gopalakrishnan, Secretary General ICID**

# THE STEP WISE APPROACH FOR “SOLUTIONS”

## The Process



**Fitting in Water for Food Security in the format is a little bit complex and hence the need to carefully articulate it.**

*Redrawn from the presentation of Prof. B. Braga at the Stockholm world water week, 8 September, 2011*

## THE TARGETS

- The series of Targets are to translate each item listed for Priority for Action; Conditions for Success lie in concrete and achievable solutions.
- It is envisioned that the targets would be **SMART** (Specific, Measurable, Achievable, Realistic, and Time-bound), and result from **WISE** (Wide Involvement, Stakeholder Engagement) processes.
- The processes which will make the targets tangible (*approached on solution-oriented methods with multi-stakeholder engagement processes*) are being focused already in our ICID conferences and Working Groups.

## THE CORE GROUPS

- **ICID** as a member of the Core Group (CG) with FAO leading, has circulated already a base document; most of its contents are embedded in the discussion paper.
- The Core Group 2.2 on **“Contribute to Food Security by optimal use of water”** is led by FAO; **ICID** will work with FAO.
- In due cognizance of their commitments, FAO and **ICID** launched a Survey. One finds listed therein, nine targets proposed for the Thematic Priority ***“Contribute to food security by optimal use of water”***.
- For each target some questions were sent for comments or views from member countries through ICID National Committees which will refine the approach paper.

# PRELIMINARY STAKEHOLDER CONSULTATIONS /VIEWS REGIONALIZATION OF THE W&F PROBLEMS

Place	Key Issues
Stockholm, June 2010	Potential competitions/conflicts between rural & urban sectors and between agriculture (the highest consumer of water) and all sectors.
Yogyakarta October '10	Core issues of W&F are highly contentious; they often reflect competing interests and perceptions.
Yogyakarta October '10	Not just between agriculture (the highest consumer of water) and all sectors there is some conflicts but also other issues, e.g. to the underlying economic models, especially with respect to smallholder market versus commercial interests play a crucial role too.
Stockholm, June 2010	Many issues of W&F are highly interconnected. The inter-linkages between W&F & other thematic, such as “cultural asset”, “energy”, “trade”, “ecosystem”, “food quality/safety and diets”, “aquaculture”, etc.
GWP Sri Lanka March 2011	The water crisis is mostly a crisis of governance; No <i>‘Business as Usual’</i> would work. Technical and Organizational solutions need to be in line with prevailing and realistically achievable governance capacities.



# FOOD SECURITY & WATER LINKAGE ..1

- Some convergence in the response to food security needs bring out a few major *constituents* of the food pathway:
  - increase the supply (productivity enhancement);
  - improve the efficiency of the value-chain from producer to consumer;
  - reduce unnecessary demand (excessive consumption & waste) and avoidable degradation (natural resources losses);
  - enhance the capacity to manage risks and uncertainties derived from crises (environmental, financial, etc).



# FOOD SECURITY & WATER LINKAGES

## ..2

- The enabling environment to make these changes need appropriate Policies, Institutions (capacity building), Private Partnerships where feasible, fair trades and other measures
- Water actions for all these , could have an analogous approach:
  - Increase the supply (thro' wastewater reuse, rainfall harvest, storage, etc;
  - Increase efficiency and productivity of water use;
  - Reduce demand (e.g., cropping allocations and ;
  - Enhance the capacity to cope with climate variability and change.

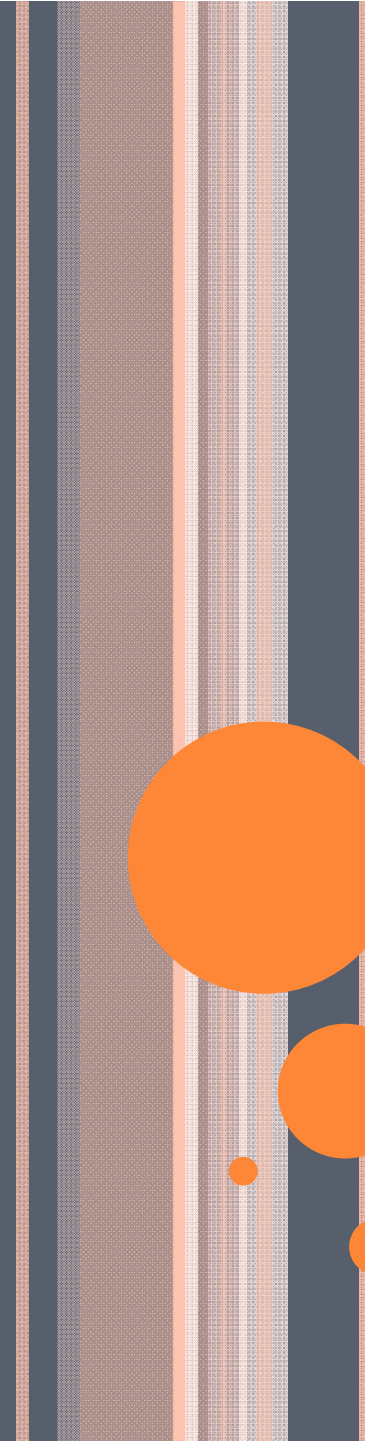


# TYPICAL RECOMMENDATIONS...LIKE...?

1	Intensification of agricultural production to reduce yield gap (rainfed, rangelands, irrigated areas)
2	More investments in water infrastructure and in agricultural water management solutions (storage, access, transport and distribution; support mechanisms)
3	Promote sustainable & adaptive way to intensify agriculture production
4	Food security strategies at the national level have to take into consideration the socioeconomic relationship between the urban and rural spaces and between agricultural and nonagricultural activities.
5	Improve the efficiency of the value-chain from producer to consumer; and reduce unnecessary demand (excessive consumption & waste-crop losses).
6	Markets have to function effectively and be regulated as food security for an increasing number of countries will depend on international trade and access to a stable supply of imports.



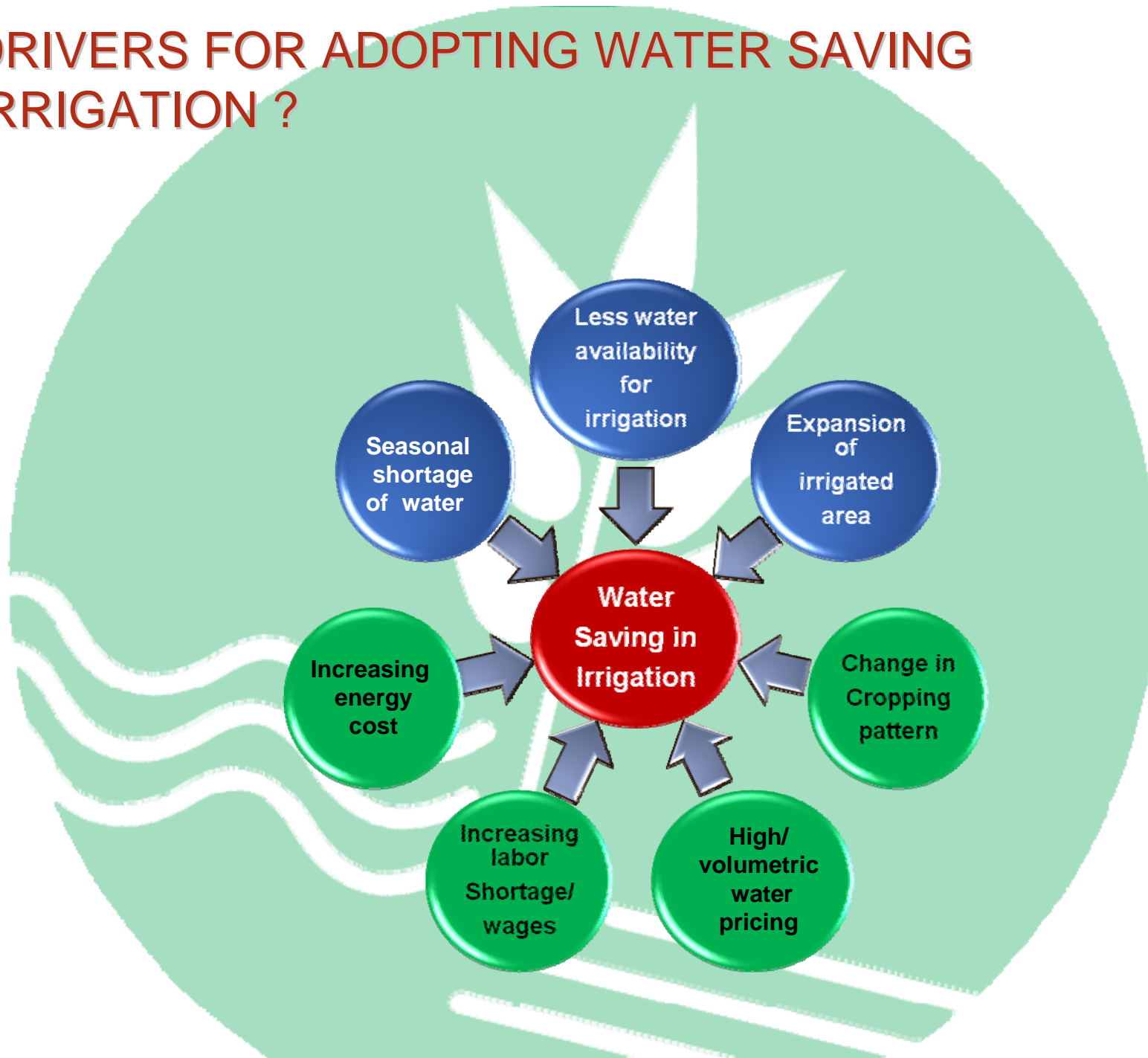




Land and Water Resources are increasingly becoming scarce while the population growth, increased need to satisfy the nutritional demands and changing food preferences in quite a few regions with enhanced living standards and affordability, ask for more food production, processing and agri chain investment and large scale grain storage (*for example: India*).

**INNOVATIVE IRRIGATION  
TECHNOLOGIES TO ENHANCE  
GLOBAL FOOD PRODUCTION ??**

# DRIVERS FOR ADOPTING WATER SAVING IRRIGATION ?

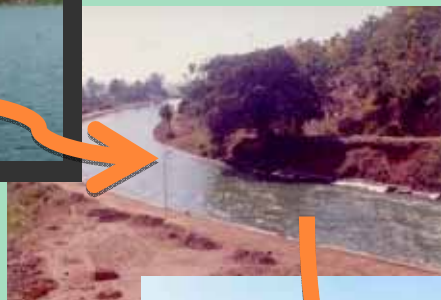




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# Where is water saving possible?

Storage



## Consumptive use

- Beneficial
  - Crop ET
- Non-beneficial
  - Non-crop ET
  - Evaporation from wet field surfaces

## Non-consumptive

### ▪ Recoverable

- Seepage
- Leakage/spill
- Unauthorized withdrawals

### ▪ Non-recoverable

- Flow to saline groundwater
- Deep sinks

Application



# ICID'S GLOBAL INITIATIVE TO ENCOURAGE "WATER SAVINGS"

- ICID *WatSave Awards*, an annual feature, acknowledge best research or innovation in I&D Sector on aspects, like
  - Technology
  - Management (Soft & Hard options)
  - Young professionals award
  - Farmers' award
- Efforts to spot 10 top technologies which can revolutionise future irrigation (& drainage) given water and land constraints from amongst them, are listed in ICID website from out of 32, duly acknowledged.

[www.icid.org](http://www.icid.org)





# GLEANNING THE 'TOP 10 TECHNOLOGIES' THAT COULD REVOLUTIONISE THE FUTURE..

- **Farmer controlled water supply, or total channel control** or downstream control of canals
- **Emitter delivery systems for precision irrigation and for undulating terrain**, not just through drip systems but also through centre pivots, especially those that can be moved from centre to centre, and with sweeps programmed to serve typical farm blocks
- **Wetting front indicator**
- **Drain controllers**, for their capability to improve control of soil moisture and stimulate sub-irrigation
- **Wetting-drying rice**, (widespread application in China)
- **No-till (NT) or minimum tillage technologies** already used to conserve erodible soils and nutrients, and save fuel, but which can also conserve water in irrigated as well as rainfed production





# GLEANNING THE TOP 10 TECHNOLOGIES THAT COULD REVOLUTIONISE THE FUTURE..... 2

- **Fresh-saline irrigation**, where saline and brackish water is used for part of the growing period without much loss of yield or detriment to the soil structure
- **Salt and drought tolerant food crops, perhaps used in conjunction with above (or independently)**, especially where irrigation is ephemeral or only supplementary
- **Remote sensing** coupled with the Internet and mobile communications **to help the farmer** with everything from establishing land tenure to **operational forecasting**
- **Drainage, an "old" technology** to improve and sustain production in rather more parts of the world than irrigation on its own. Also, some of the remarkable experiences in mixing fresh water & drainage (Egypt) augments supply



## A FEW *PERSONAL* OBSERVATIONS ON THE “DRAFT DOCUMENT ON CENTRAL ASIA” FOR DISCUSSIONS...

- In the “Target tree for Adoption of Innovations in Agrarian Sector in order to Achieve Food Security”, could one consider inclusion of Storage (Farm Ponds and on farm storage)? One can also explore downstream reregulation structures to obtain “in season” moderation of flow to suit irrigated agriculture needs
- Augmenting water resources by “Waste Water Reuse”:  
This is increasingly important. In addition to what had been envisaged under Target 2.3.2, application of “*Drainframe*” a *technology* in ICID website, *may be useful*; DRAINFRAME looks at it from an IWRM perspective and follows a participatory approach in analyses and planning.



# COUNTRY POLICY SUPPORT PROGRAMME (CPSP) BY SCENARIO DEVELOPMENT, LOOKING BASIN HOLISTICALLY

- The proportion of the available water that is consumed is an important indicator of development of a basin
- The *desirable* level of such consumption depends on the land use apart from the season, the precipitation, and the quantity of water that is needed to support
  - consumptive and
  - non-consumptive usesthat depend upon stream flow and groundwater recharge
- The evolution of 'BHIWA' as an important CPSP outcome to capture these processes, as fully as a good planning exercise would demand
- Rapid Scenario Tests are possible to guide policies

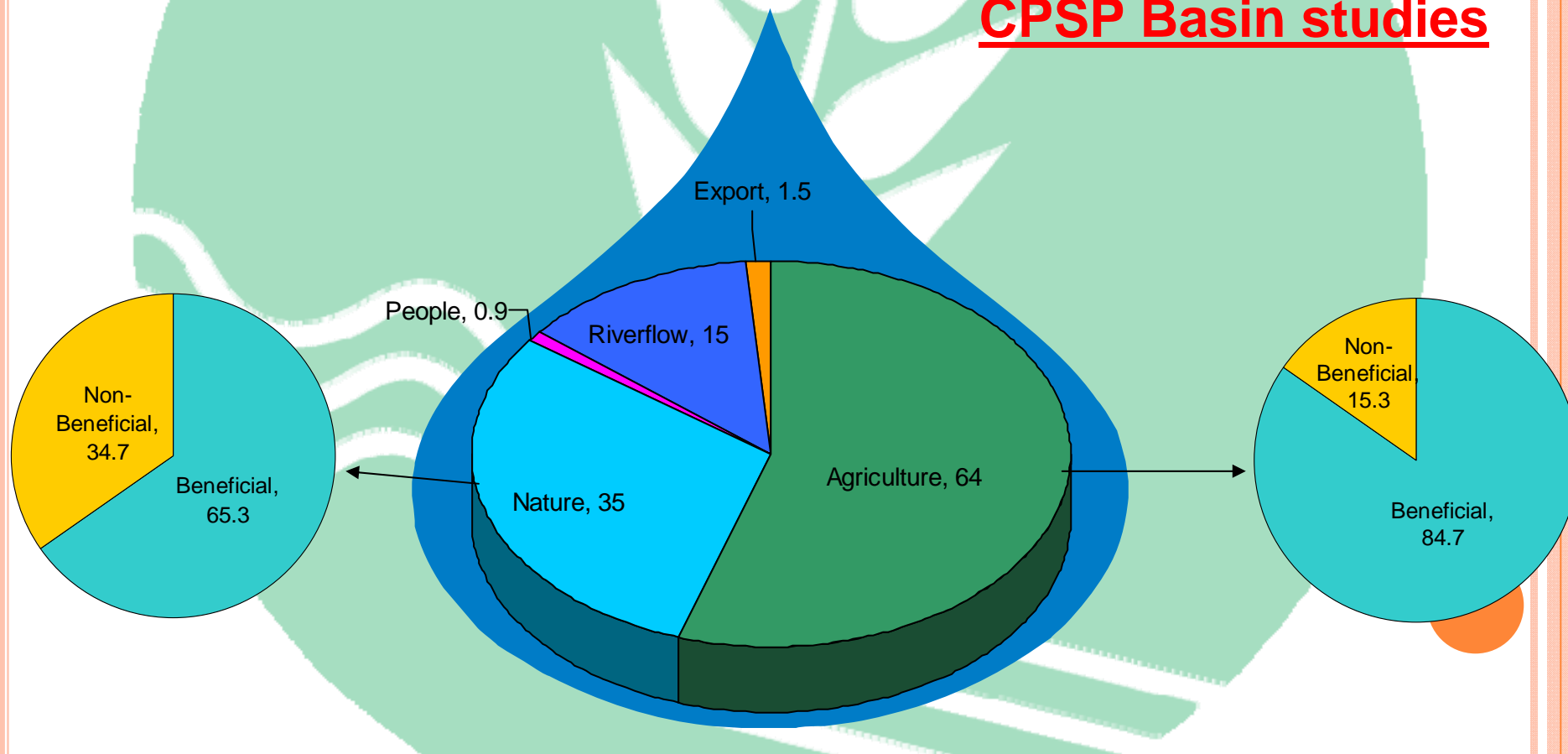


# India: Sabarmati River Basin (1995)

Rainfall  
91%

+ Import  
9%

## Typical Outputs from CPSP Basin studies



## LOOKING “BASIN AS A WHOLE” FOR SUSTAINABLE IWRM

- The basin approach is useful and can serve better to project objectively the impact of several options in Scenario Development and can help negotiations on an acceptable *approach (like benefit sharing or water sharing or any other negotiated settlements)*.
- Crucial in all such cases are ‘the spirit of and importance of cooperation’.
- Cooperative Actions for Water Security shall be the key for peace and prosperity!
- Please visit [http://www.icid.org/cpsp\\_link.html#w\\_cpsp](http://www.icid.org/cpsp_link.html#w_cpsp) for more details on the CPSP approach tool that S&T could provide for Policy makers.





## IN THE END

- ICID congratulates the organisers for the regional efforts in cooperative actions for water security and food security
- Scoping opportunities through IPTRID, *in its newly envisaged form* during IEC of ICID 2010 in Yogyakarta, could help “appropriate technology transformation” and adapting appropriate new technologies
- Opportunities can be explored in a planned Water Savings workshop in Beijing (CNCID) in June 2011; twinning possibilities between ICID National Committees to enhance technology research and uptake is welcome....



# Turkey has changed Irrigation from traditional to modern since 2003



# Water Saving Initiatives in China



- In China, various water saving measures and modernization works are being taken up on large scale since 1990s.
- Share of irrigation water withdrawal in the total fresh water use has decreased from 80% in 1980 to about 60% at present (340 BCM)
- Water use per ha dropped from 7935 to 6450 cum/ha nationwide.
- From 1998 to 2005 invested about US42.7 billion to modernize 225 large irrigation schemes.



# Modern Control Structures in Conveyance Network





# Flow measurement & Cost recovery result in water saving...





# ENHANCING SURFACE IRRIGATION EFFICIENCIES



# Modern gravity/ surface irrigation system





# Supervisory control



MUDA, Malaysia



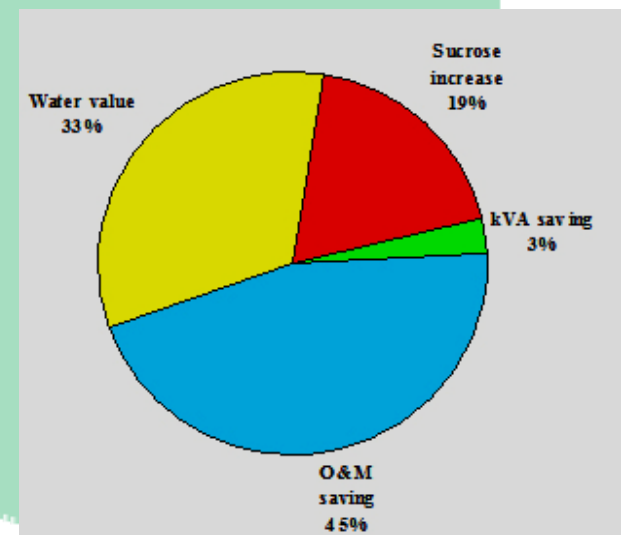
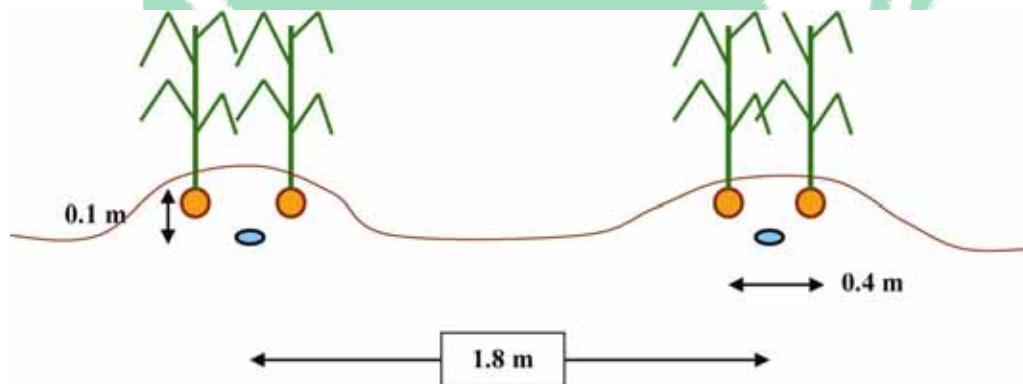


Micro irrigation technology has dramatically changed the way crops are irrigated





# SUBSURFACE DRIP IRRIGATION FOR SUGARCANE IN SOUTH AFRICA





# Mechanized Sprinkler Irrigation Systems



# Micro and sprinkler irrigation systems for small holdings



Portable micro/ sprinkler irrigation units



Low-cost small scale drip irrigation unit





# ON-FARM RESERVOIRS/ FARM PONDS



# Rice irrigation



- Rice is grown in 113 countries
- Total harvested area of rice is about 150 million ha
- Irrigated rice area is about 80 million ha
- About 50% of the Asia's irrigation water withdrawal is for rice
- About 90% of rice is produced & consumed in Asia





## Paddy cultivation in Egypt by Strip method



Transplanting



20 days after transplanting



90 days after transplanting

WUE (kg/cum); Traditional method; 0.6; Strip method: 1



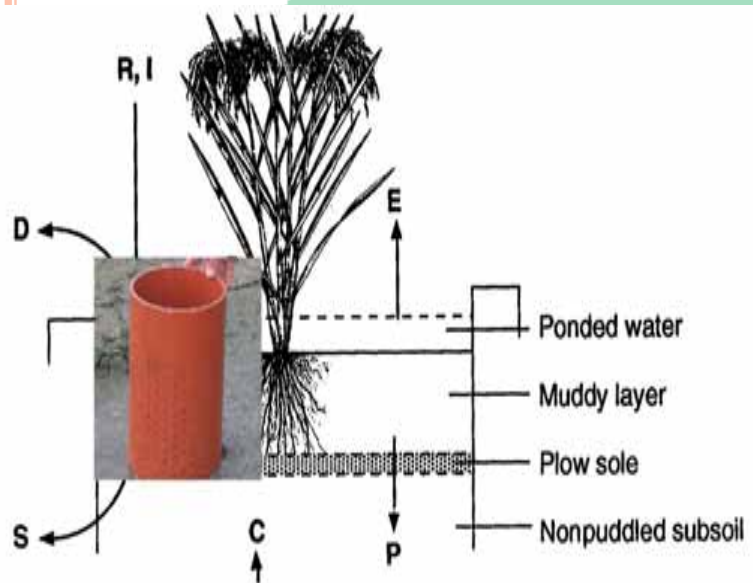
WUE (Kg/ cum)  
Traditional : 0.2  
Furrow method: 0.4

Paddy cultivation on beds and furrows in Pakistan



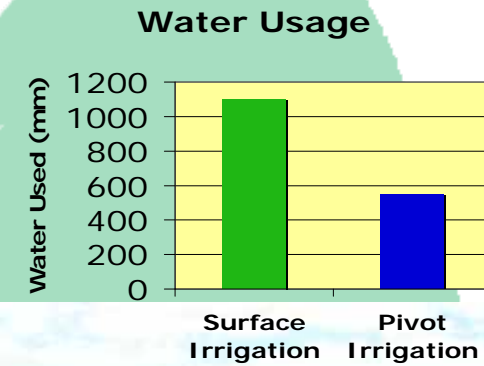


# Alternate wetting and drying (AWD) irrigation of rice





# Center pivot irrigating Rice crop in Brazil





# System of Rice Intensification (SRI)



40% SAVING IN WATER  
HIGHER CROP YIELDS (7 -8 TONS/HA)

**High labor & reliable water supply are required**



# Saving through drainage measures



Watrlogged field

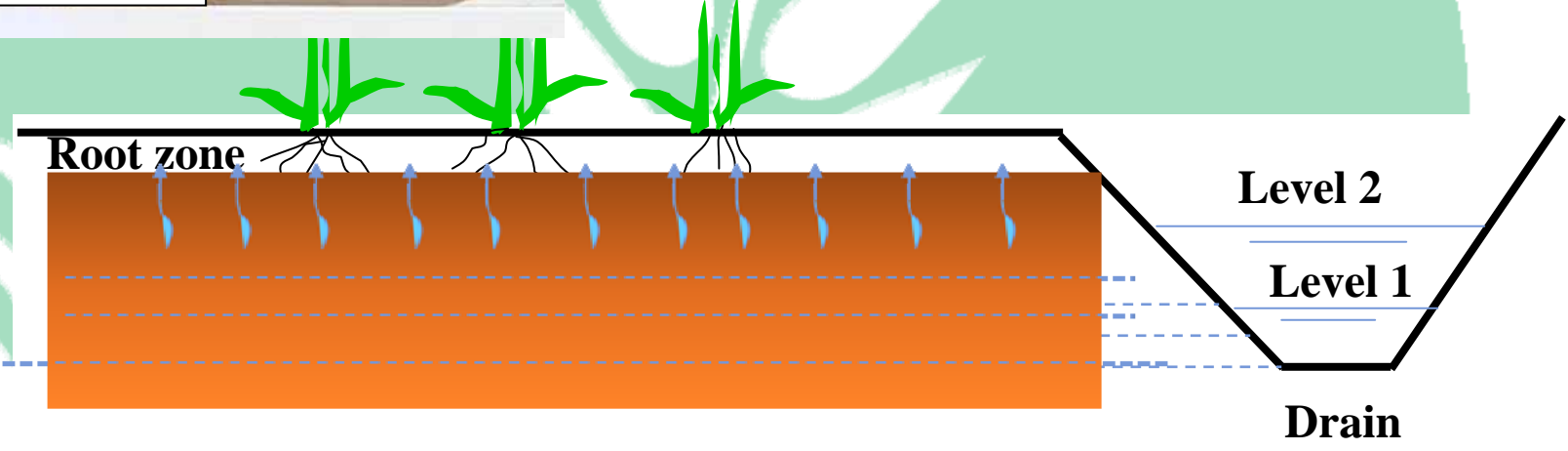
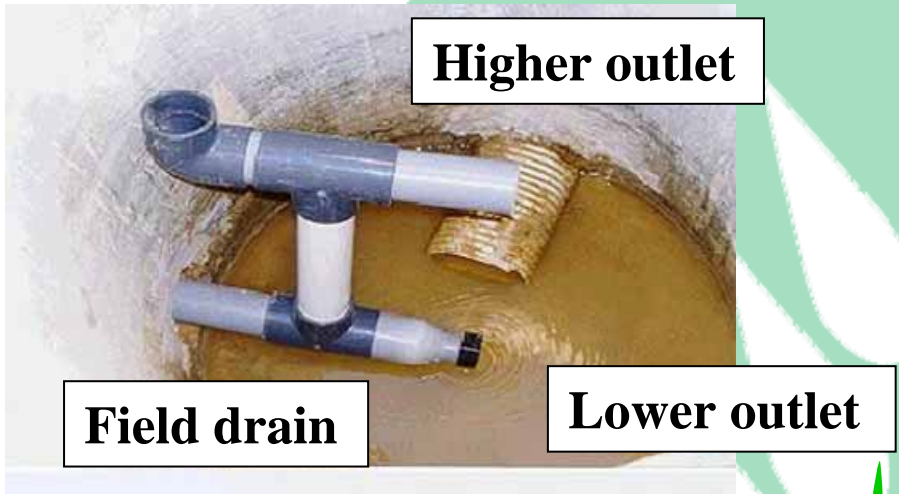


Saline soil

Sub surface drainage installation







# CONTROLLED DRAINAGE

# Use of wastewater for irrigation



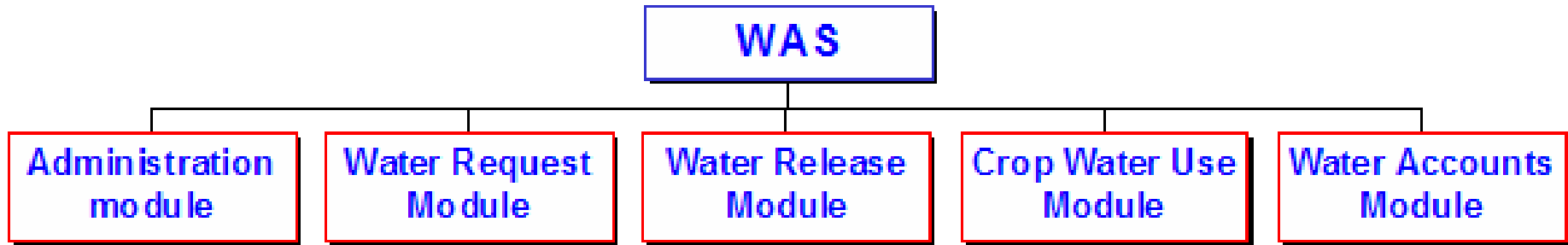
**Wastewater ~**  
**500 million m<sup>3</sup> WW/year**  
50% treated to secondary level  
30% treated to tertiary level  
4% discharged via cesspits  
16% inadequately treated



Mix junction using effluent and saline water.



# Water Administration System (WAS), South Africa



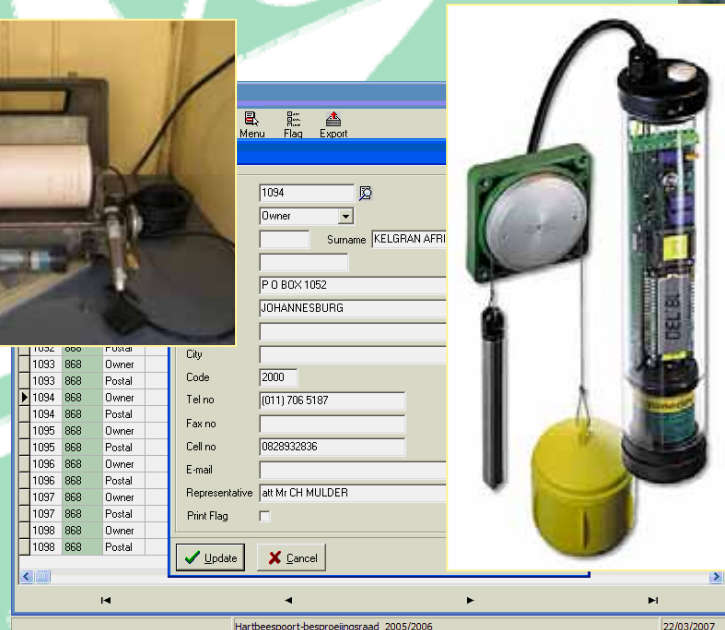
Computerized water management system used on 142,000 ha, water savings = 10 - 20%

Date and time flow data collected from

- chart recorders
- electronic loggers

Data can be

- captured
- imported
- digitized

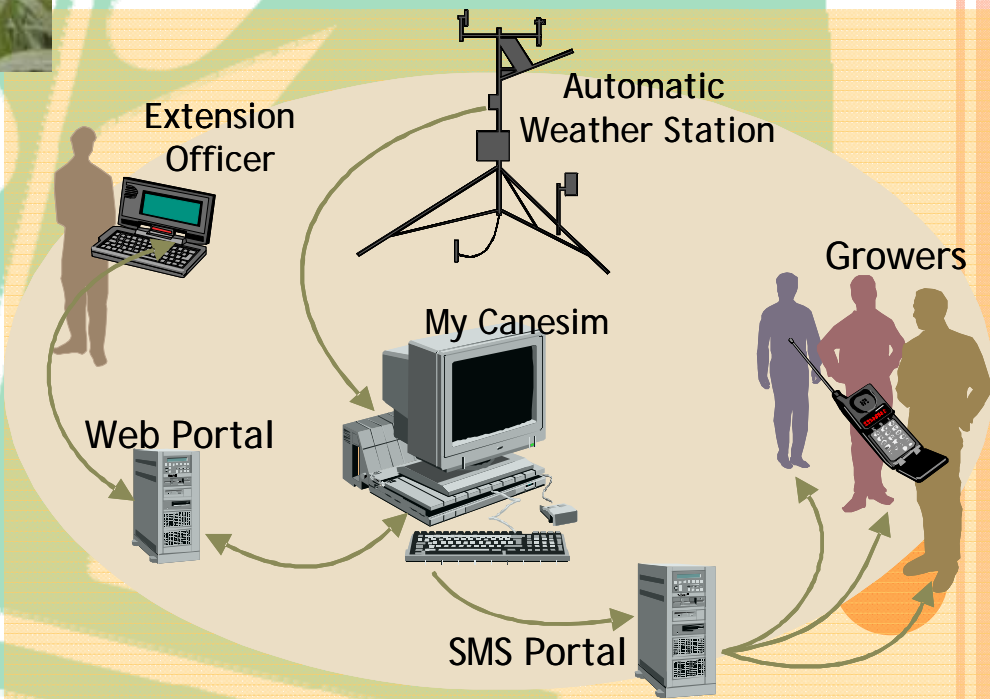


# Water teller, Murcia district, Spain





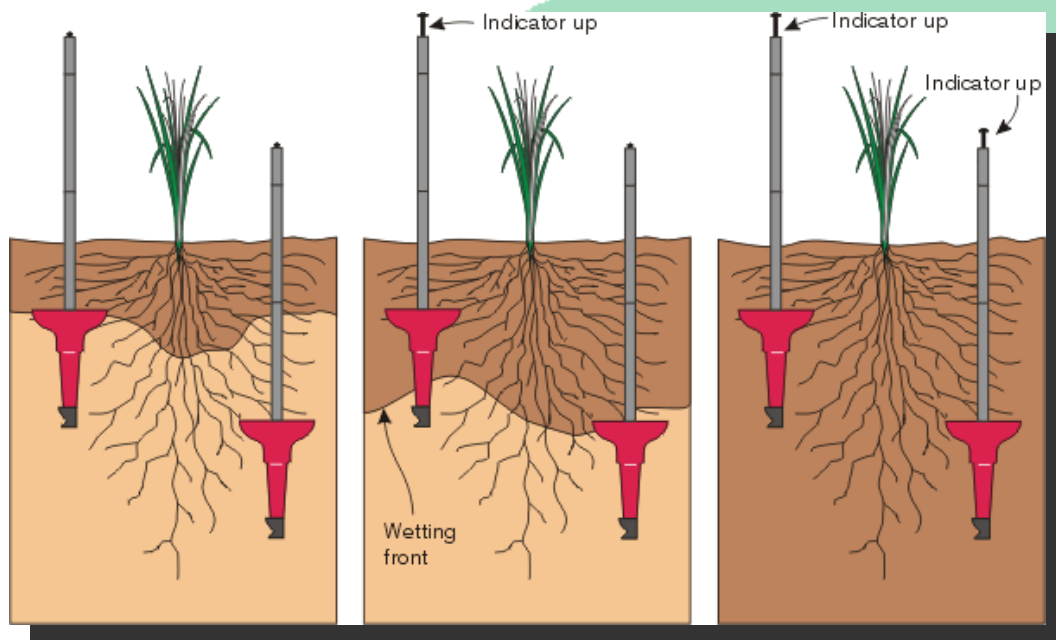
# Irrigation scheduling using 'My Canesim' in South Africa



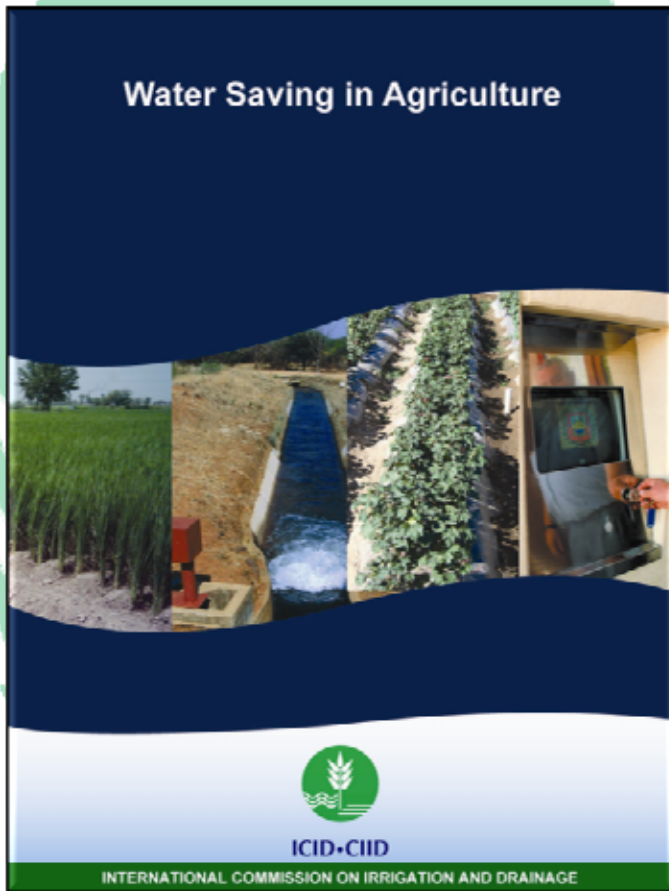


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# Wetting front detector



# ICID Documentation



The book is a compilation of watsave award winning contributions as well as case studies, experiences/ initiatives from across the world

