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IPTRID

Supporting capacity development for sustainable agricultural water management

IPTRID is an international multi-donor trust fund programme of FAO, co-managed with its partner institutions. The programme is implemented by the IPTRID Secretariat, hosted in the Land and Water Development Division of FAO and drawing on a worldwide network of leading centres of excellence in the field of irrigation, drainage and water resources management.

The programme aims at supporting capacity development for sustainable agricultural water management to reduce poverty, enhance food security and improve livelihoods, while conserving the environment. IPTRID provides advisory services and technical assistance to governments and funding institutions to stimulate increased and more effective investment, assisting them in formulating and implementing capacity development strategies and programmes.

IPTRID was created in 1990 by the World Bank and the United Nations Development Programme (UNDP) in collaboration with the International Commission on Irrigation and Drainage (ICID). First located at the World Bank in Washington, the IPTRID Secretariat was transferred in 1998 to the FAO in Rome. The present programme is co-financed by FAO, France, The United Kingdom, The Netherlands, Spain, The World Bank, The International Fund for Agricultural Development (IFAD) and The European Commission.

IPTRID is developing partnership with an increasing number of funding institutions and governments. During the last ten years, it has been supported by more than 20 international organizations and government agencies, and has cooperated with more than 60 partners in about 40 developing countries and countries in transition.

IPTRID Framework

Goal
More efficient and productive water use in agriculture as a means of reducing poverty, enhance food security and improve livehoods, while conserving the environment

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Purpose
Supporting capacity development for sustainable agricultural water management in developing countries and countries in transition

↓

Core activities

Support for strategies	Support for projects	Communication and advocacy
needs assessment studies	identification reports	IPTRID Information System
workshops	formulation reports	publications
strategies and programmes	funding facilitation	promotional documents

↓

Implementation of capacity development programmes

IPTRID Network of centres of excellence

FAO
ICID
IWMI
HR-Wallingford, UK
Alterra-ILRI, The Netherlands
Cemagref, France
DGDR-MAPA, Spain
IAM-Bari, Italy
USBR, United States
INRGREF, Tunisia
NWRC, Egypt
ICWC, Aral Sea Basin
EIER-ETSHER, West Africa

IPTRID Secretariat

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www.fao.org/iptrid

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grid

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IPTRID Network Magazine

IPTRID
International Programme for Technology and Research in Irrigation and Drainage

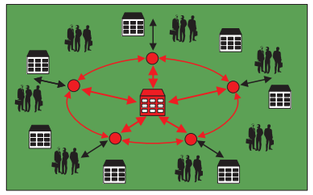
Issue 21, November 2003
Published twice yearly

GRID
IPTRID Magazine

Aim and scope

GRID is published to assist communication between researchers and professionals in the spheres of irrigation and drainage. It informs readers about IPTRID activities, and about research and development in irrigation an drainage with a view to stimulating international debate on these issues.

GRID is produced for professionals working, or having an interest in irrigation and drainage projects in developing countries. It covers all relevant disciplines including engineering, agriculture and the social sciences.



Submission of material
GRID invites short written contributions, principally for the Diary and Forum sections. They may include photographs or drawings, which must be of high quality and suitable for reproduction at reduced size. Contributions should be sent to GRID Newsletter, HR Wallingford, Howbery Park, Wallingford, Oxford-shire OX10 8BA, UK.

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Jean Verdier
Maru Martinez

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IPTRID Secretariat, Rome

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Date for submission of material for Issue 22 is January 31st 2004

Cover photo: Group of women collecting tomatoes in the Niayes region, Senegal

Diary

CONFERENCES AND SYMPOSIA

Details od events listed in this section are based on information provided by the respective organisers and from information gathered elsewhere. We welcome any information about future events for inclusion in subsequent issues. A more comprehensive listing of forthcoming events can be obtained from the editors of GRID, who can be contacted at the address shown on the inside front cover or by using the following e-mail address: www.iptrid@hrwallingford.co.uk

October 13-15, 2003
Shijiazhuang, Hebei Province, China.
International Symposium on Integrated Water Resources Management
Contact: Dr. Dajun Shen
Global Water Partnership, c/o Dept. of Water Resources, China Institute of Water Resources and Hydropower Research, Beijing 100044, China
Tel: +86-13910329775 (mobile), 86-10-68415522 ext. 3702
Fax: +86-10-68483367
E-mail: shendj@iwhr.com
Web: http://www.gwpforum.org/servlet/PSP?iNodeID=127

October 19- 21, 2003
Shepparton Victoria, Australia
50th National Irrigation Conference – Australian National Committee on Irrigation and Drainage
Contact: ANCID 2003 Conference Secretariat
Professional Conference Services, 137 Gardenvale Road, GARDENVALE VIC 3185
Tel: +03 9530 6777
Fax: +03 9530 6526
Email: services@profconferences.com
Website: www.ancid.org.au

November 10-12, 2003
Ouagadougou, Burkina Faso
Third General assembly of RAID (Regional Association for Irrigation and Drainage), International Conference on " Practical experiences of smallholder irrigation in Sub-Saharan Africa"
Contact : ARID (Association Regionale pour l'Irrigation et le Drainage en Afrique de l'Ouest).
Web : www.eieretsher.org/arid; www.eieretsher.org/arid
Mail : arid@eieretsher.org; arid@eieretsher.org>
Tel : +226 36 14 27 Fax : +226 31 27 24

November 12-14, 2003
Mexico City, Mexico
4th International Symposium on Wastewater Reclamation and Reuse
Contact: Alma C. Chavez Mejia
Instituto de Ingenieria, UNAM, Apartado Postal 70-472, Ciudad, Universitaria, 04510, Mexico, D.F.
Fax: +525 622-3433
Email: acm@pumas.iingen.unam.mx
Web: http://www.iingen.unam.mx/isw/index1.html

November 10 –12, 2003
Taipei, Taiwan
ICID Asian Regional Workshop - Sustainable water resources development and Management and operation of participatory irrigation organizations
Contact : Prof. Yi-Chi Tan
Secretary General of Chinese Taipei Committee, Secretary General, ICID Chinese Taipei Committee, Dept. of Bio-environemtnal System Engineering, National Taiwan University, ! Roosevelt Road, Sec. 4, Taipei 106, Taiwan
Tel: +886-2-2369-2630
Fax: +886-2-2363-9557
E-mail : yctan@ccms.ntu.edu.tw or kuosf@mail.leader.edu.tw (Dr. Kuo, Sheng-Geng),
Web : http://www.water.tku.edu.tw/icid2003

November 17-21, 2003
Chiang Mai, Thailand.
First Southeast Asia Water Forum – Strengthening regional capacity through best practices in integrated water resources management (IWRM)
Contact: Southeast Asia Regional Water Forum Secretariat c/o GWP SEATAC, WR 104 WEM/SCE, Asian Institute of Technology, P.O. Box 4, Klong Luang, Pathumthani, 12120 Thailand
Tel. (+66 2) 524 6067, 524 5558
Fax (+66 2) 524 5550
Email: gwp_seatac@ait.ac.th
Web: www.gwpseatac.org

November 18-20, 2003
San Diego, USA
24th Annual International Irrigation Show
Contact: The Irrigation Association
6540 Arlington Boulevard, Falls Church, VA 22042, USA
Tel: +1 703 536 7080
Fax : +1 703 536 7019
E-mail: webmaster@irrigation.org
Web: http://www.irrigation.org

November 24-26, 2003
Chiang Mai, Thailand
Workshop on "Gaining Public Acceptance"
Contact: Dr. Khin Ni Ni Thein
Senior Advisor, United Nations Environment Programme - Dams and Development Project (UNEP-DDP), PO Box 30552, Nairobi, Kenya
Tel: +254-2-624517
Fax: +254-2-623545
E-mail: knn.thein@unep.org
Web: www.unep-dams.org

15 to 18 December 2003
BHOPAL, MADHYA PRADESH (M.P.), India
International Conference on Water and Environment
Contact: Dr. R.N. Yadava
Regional Research Laboratory, Bhopal 462026, INDIA
Tel: +91-0755-2589343
Fax: +91-0755-2587042
E-mail: dryadava@yahoo.com, conference@rrlbpl-we2003.com, secretary@rrlbpl-we2003.com
Website: http://www.rrlbpl-we2003.com/committee.htm

March 14-17, 2004
Echuca, Australia
2nd ICID Asian Regional Conference - Irrigation in the total catchment management.
Contact: Mr. John Mapson
Secretary/Treasurer, Australian National Committee, ICID (ANCID), Manager Water Services, Goulburn-Murray Water, P.O. Box 165, Tutura Vic 3616,
Tel: +61 3 5833 5515
Fax : +61 3 5833 5502,
E-Mail: johnmap@g-mwater.com.au,
Web: http://www.icid2004.com

March 22-27, 2004
Lahore, Pakistan
International Training Workshop on "HydroSalinity Abatement and Advanced Techniques for Sustainable Irrigated Agriculture"
Contact: Dr. M.Mazhar Saeed, Workshop Secretriate
Centre of Excellence in Water Resources Engineering (CEWRE), UET-Lahore, Pakistan
Email: mazhar_cewre@yahoo.com (Dr. M.Mazhar Saeed) or smahmoodpk@yahoo.com (Eng. Sajid Mahmood Azeemi, Co-Secretary) or center@xcess.net.pk (CEWRE)

May 30 – June 3, 2004
Amman, Jordan
International Water Demand Management Conference
Contact: Ms. Hala Dahlan, Conference Manager,
The Water Efficiency and Public Information for Action (WEPIA), P.O.Box: 850561 Amman 11185 Jordan
Tel: +962 6 5527893/5
Fax: +962 6 5527894
E-mail: hdahlan@go.com.jo
Web: http://www.wdm2004.org/

June 21-24, 2004
Singapore
Sixth International Conference on Hydroinformatics
Contact: Integrated Meetings Specialist Pte Ltd
1122A Serangoon Road, Singapore 328206
Tel: +65 6295 5790
Fax: +65 6295 5792
E-mail: HIC2004@inmeet.com.sg
Web: www.eng.nus.edu.sg/civil/conf/HIC2004

June 23-25, 2004
Naples, Italy
Second International Conference on Fluvial Hydraulics
Contact: River Flow 2004
Dipartimento di Ingegneria Idraulica ed Ambientale "Girolamo Ippolito", Universita di Napoli Federico II, Via Claudio, 21, 80125, Naples, Italy
Tel: +39-081-7683427
Fax: +39-081-5938936
E-mail: riverflow2004@riverflow2004.unina.it
Web: www.riverflow2004.unina.it

July 26-31, 2004
Changchun, Jilin Province, P.R. China
International Conference on Water Security for Future Generations
Contact: Professor Zhang Bai, Secretariat
Email: icwsfg@mail.neigae.ac.cn
Web: http://www.neigae.ac.cn/conference/20030227.htm#General_Information

September 7, 2004
Moscow, Russia
International Workshop on Water Harvesting and Sustainable Agriculture
Cotact: Mr. S. Nairizi
No. 24, Shahrsaz Lane. Kargozar St., Zafar Avenue. Tehran, Iran.
Tel. : + 982 1 2257348
Fax: +982 1 2272285
E-mail: s.nairizi@tooss-ab.com

September 1-8, 2004
Moscow, Russia
Inter-Regional Conference on Food Production and Water: Social and Economic Issues of Irrigation and Drainage
Contact : Dr. M.G. Chuelov
Secretary General, Russian National Committee on Irrigation and Drainage, Russian National Committee on Irrigation and Drainage, C/o Ministry of Agriculture and Food of the Russian Federation, 1/11, Orlikov per., Moscow 107139, Russia.
Fax (7095) 207-8522
E-mail : bubera@wm.west-call.com.

September, 2004
Cairo, Egypt
1st African Regional Conference : Integrated water resources management towards poverty alleviation
Contact : Eng. Hussien El-Atfy
Secretary, Egyptian National Committee on Irrigation and Drainage (ENCID), Ministry of Public Works and Water Resources, El-Shawatie Building, P.O. Box 86, Shoubra El-Khaima, Postal Code 13411, Cairo, Egypt
Tel : +20 2 312 3275
Fax : +20 2 310 9591
E-mail : encid@link.com.eg

September 1-8, 2004
Moscow, Russia
55th ICID IEC meeting
Contact : Dr. M.G. Chuelov
Secretary General, Russian National Committee on Irrigation and Drainage, Russian National Committee on Irrigation and Drainage, C/o Ministry of Agriculture and Food of the Russian Federation, 1/11, Orlikov per., Moscow 107139, Russia.
Fax: (7095) 207-8522
E-mail : moscowconfer2004@mail.ru
Website : http://www.vniigim.ru/conf/55/prospect.pdf

September 12-17, 2004
Madrid, Spain
Fifth International Symposium on Ecohydraulics
– Aquatic habitats: analysis and restoration
Contact: Prof. Dr. Diego Garcia de jalon
Escuela de Ingenieros de Montes, Universidad Politecnica de Madrid, 28040, Madrid, Spain
Tel: +34 91 3366385
Fax: +34 91 3366386
E-mail: ecohydraulics@montes.upm.es
Web: www.tilesa.es/ecohydraulics

September 19-24, 2004
Marrakech, Morocco
World Water Congress and Exhibition
Contact: International Water Association
Alliance House, 12 Caxton Street, London SW1H0Qs, United Kingdom
Tel: +44 (0)20 7654 5500
Fax: +44 (0)20 7654 5555
Email: water@iwahq.org.uk
Web: www.iwahq.org.uk

October 18-21, 2004
Yichang, China
Ninth International Symposium on River Sedimentation
Contact: Dr. Hu Chunhong
IRTCES, 20 Chegongzhuang Xilu, Bejing 100044, China
Tel: +86 10 68413372
Fax: +86 10 68411174
E-mail: irtces@public.bta.net.cn
Web: irtces@95777.com

CENTER[1] – IPTRID's new partner from Spain

Irrigation pivots

Parshall flume

Agriculture in Spain fundamentally relies on irrigation due to the arid weather conditions and constraints in water distribution. Furthermore, there are growing public demands to limit the use of water in farming, and to apply it more efficiently.

Spain's National Irrigation Plan (PNR) was drafted for the Ministry of Agriculture, Fisheries and Food (MAPA) as a means to develop solutions. The PNR went into immediate operation in April 2002, and will run to 2008. It takes into account water resources, soil and climatic limitations, demographic, social and economic aspects and policy. Although Spain's irrigated area (about 3.8 million hectares) is unlikely to increase greatly, there is a need to achieve greater efficiency in the transport, application and management of water. The National Centre for Irrigation Technology (CENTER) is involved in the modernisation plan through, for example, providing advice on improving irrigation systems.

CENTER is located on a 106 ha site near Madrid, and it is part of MAPA's Directorate General for Rural Development. It has teaching facilities for just under 100 long-term trainees, and maintains various irrigation system facilities, including:

- Measuring and filtering equipment - prior to use by the sprinkler, pivot and local irrigation systems, water passes through volumetric measuring equipment and automatic self cleaning filtering systems.
- Gravity irrigation - a total of 16 ha of land is irrigated by furrows and checks.
- Sprinkler irrigation - the main irrigation system (67 ha) comprises:- stationery blocks - 19 ha, mobile blocks - 19 ha, mobile lines - 7 ha, pivot - 17 ha, and lateral irrigation - 5 ha. Sprinklers are also used on 7ha as support of other irrigation systems.
- Localized irrigation - 6 ha of greenhouses and other crops such as fruit trees.
- Telemetred lysimeter
- Telemetered weather stations (2)
- Fertigation - Two automatic fertilizer injection stations.
- Drainage - a subsurface drainage system of 3 ha with automatic pumps.
- Remote monitoring and control for irrigation system.

CENTER's work plan

The state-owned company TRAGSA is responsible for running the centre under the supervision of MAPA. The main content of CENTER's work is:

Technology transfer

- International Master's Degree in Irrigation and Drainage – 6 month course on planning and design.
- International Course (with AECI) in Irrigation Techniques and Management for Latin - American engineers.
- Short Courses (with AECI) for Middle Eastern and Maghreb participants.
- National Seminars or short courses for technicians from Spanish and Portuguese public authorities on new products and technical advances.
- Short courses for farmers on management and organisation.

Irrigation materials and equipment testing

Continuous field tests are being carried out to assess the performance of various systems and equipment, and to support the task of standardisation. A new central laboratory will open shortly.

Assessment of irrigated zones

CENTER's assessment of irrigated zones in Spain (as part of the National Irrigation Plan) involves monitoring certain areas turned over to irrigation or modernised with economic aid from the Government.

Standardization

CENTER works on the standardisation of equipment and materials for the irrigation sector. This involves drafting, reviewing and interpreting standards. This is done for three standardisation agencies: ISO (International Organization for Standardization) at an international level; CEN (European Committee for Standardization) at a European level; and AENOR (Spanish Association for Standardization and Certification) at a national level. CENTER provides technical support for AENOR, and is responsible for standardisation of localised irrigation systems in order to define the trial characteristics and compliance standards, for drafting a standard on the architecture, functionality and trial methods for a remote-control system.

International scope

CENTER represents the Spanish Irrigation Technology sector through these, and several other activities. These include partnership with international organisations working in the irrigation field, such as IPTRID, ICID, ENTAM and with many other national organisations in countries such as France, Portugal, Mexico, Chile, etc.

New publication

Technology innovation and promotion in practice: pumps, channels and wells

Despite the fact that groundwater exploitation is important to farmers across large parts of the world, little work has gone into uprating the technologies that are used. There are more than 10 million pump sets currently being utilised in South Asia, but the sector has remained somewhat of a blind spot. In fact, large improvements are possible in fuel efficiency, convenience and social impacts. This recent publication discusses possible improvements in pump-sets ñ both manually-operated and diesel-operated - as well as in well technology and water conveyance. A strong message from the book is that the development of the technology that farmers need is in actuality a social process ñ for instance finding ways to introduce and promote changes can be as important. For instance the stone-hammer technique for manual drilling developed as an alternative to dug-well technology in Terai region of North Bengal.

The book focuses in turn on diesel pump sets, manual pump-sets, tube-wells, stone-hammer shallow well installation, alternative water conveyance techniques, dissemination appropriate to reach potential users, and rural marketing. The aim of the book is to bring together practical work done in improving the fuel efficiency of low-lift irrigation systems. This is not a marginal topic in countries such as India where there are up to 10 million diesel operated tube-wells in operation, almost all private, and most run by small farmers.

The book is published by the Tata Energy Research Institute (TERI) Habitat Place, Lodhi Rd., New Delhi 110 003 (ISBN 81-7993-009-2), and can be ordered through outreach@teri.res.in (Rs 250 in India and US$20 outside).

[1] CENTER, Camino de la Vega s/n. 28830 San Fernando de Henares, Madrid, Spain

IPTRID's new partnership programme launched

by Olivier Cogels[1]

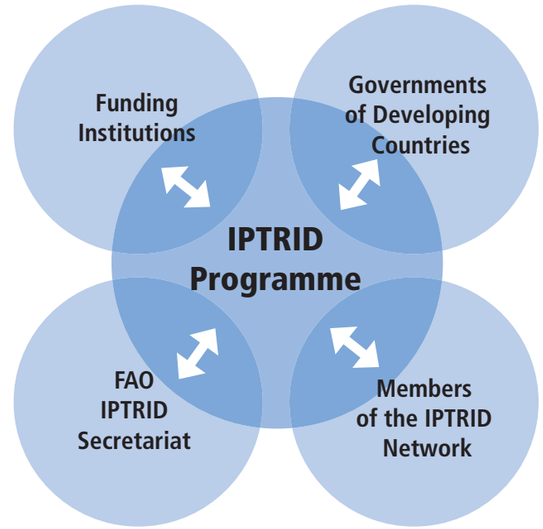
The 2003-2005 programme for IPTRID aims at supporting Capacity Development for Sustainable Agricultural Water Management. It was launched at the recent IPTRID Consultative Group held during the ICID International Conference at Montpellier in September 2003. The challenge for IPTRID is to support increased investment in human and institutional capacity through:

- **assisting developing countries in assessing priority needs and in formulating sustainable agricultural water management strategies**
- **facilitating funding and implementation of capacity development programmes and projects.**

Why IPTRID

World irrigation has grown from 8 Mha in 1800, to 275 Mha today, and now produces over 40% of the world's food and fibre needs and 60% of world's cereals. World population is expected to grow by a further 30% in the next 25 years, mainly in the developing world where water is in short supply. More than 1.3 billion people do not have access to enough food at household level and the problem is growing. Many live in dry and drought prone areas where the main livelihood depends on water and agriculture. The case for continuing support for irrigated agriculture is a very strong one and the current consensus among policy makers in the developing world is that irrigated agriculture has a major role to play in meeting the Millennium goals. Although there is no doubt that irrigation and drainage will thus continue to play a major role in food production and poverty alleviation, this is not without serious risks and difficulties. Unfortunately, water in agriculture is indeed too often misused and mismanaged due to lack of know-how of people and weakness of institutions. The consequences include: lack of maintenance, groundwater depletion, intrusion of saline water in coastal aquifers, land salinization, poor water productivity, conflicts, etc.

To improve the efficiency of water use in agriculture and to avoid further environmental setbacks, it is clear that human and institutional factors have to be taken much more into account in development programmes and investment strategies of donors and governments. There is a need for more investment in capacity development at all levels - from farmers to government. Capacity development must be seen as an integrated concept that goes well beyond training. In view of these problems, investment in capacity development for agricultural water management is urgently needed:



1. to strengthen knowledge through
- enhancing research capacities,
- enhancing experimentation and demonstration capacities,
- developing information and knowledge dissemination systems,

2. to strengthen skills and know-how through
- developing training and education programmes,
- organizing exchanges of experience,
- producing field guides and training material,

3. to strengthen institutions through
- organizing water user associations and support services (private and public),
- developing monitoring and decision-support systems,
- strengthening planning capacities,

4. to strengthen legislation through
- developing laws and regulations,

5. to increase awareness through
- building up awareness and understanding of stakeholders and decision makers.

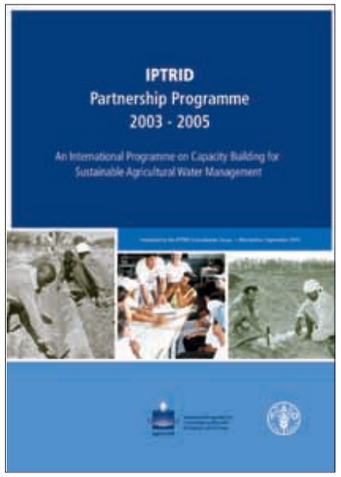
The amount needed is difficult to estimate, but is in the range of US$1 billion per year. Such investments and development actions need substantial technical assistance in project preparation, funding facilitation and assistance for project implementation. And that's where IPTRID comes in.

The IPTRID Programme

IPTRID is an international multi-donor trust fund programme of FAO, co-managed with its contributing partners such France, United Kingdom, The Netherlands, Spain, World Bank, IFAD, European Commission.

The 2003-2005 partnership programme for IPTRID was officially approved at the recent IPTRID Consultative Group held during the ICID International Executive Council at Montpellier in September 2003.

[1] Programme Manager, IPTRID, FAO, Rome



This publication containing full explanation of the Programme, can be requested from IPTRID

The programme objective is to support Capacity Development for sustainable agricultural water management in developing countries and countries in transition, in order to reduce poverty, enhance food security and improve livelihoods, while conserving the environment. The programme aims at stimulating increased investment, by Governments and external funding institutions. It provides advisory services and technical assistance in the form of pre-investment activities, and by actions that make the investment more effective.

The programme is organized according to three main production lines:

- support for strategies: assessment of priority needs and formulation of sustainable agricultural water management strategies and programmes,
- support for projects: project identification, formulation, and assistance for implementation,
- communication and advocacy and awareness: providing information and building awareness on agricultural water management and capacity development issues.

IPTRID is thus focusing on a more limited range of activities than it did previously. These define its specific "niche". IPTRID is working as an "architect", formulating integrated capacity development strategies and programmes, seeking to bridge the gap between research and actual take-up, and ensuring that valuable technologies and research results are made available to developing countries. The enhancement of research capacity, which was one of the main objectives, is now incorporated into IPTRID's concept of "capacity development". This is seen as an integrated concept that embraces applied research training, demons-tration, technology transfer, participation, empowerment, legislation and institutional development.

IPTRID is broadening its scope from irrigation and drainage to all aspects of agricultural water management - such as drainage of non-irrigated land, flood control, watershed management, and water resources management. Modernization of existing irrigation schemes and development of smallholder/small-scale irrigation remain priority issues.

Beneficiaries

IPTRID's beneficiaries are developing countries at regional, national and local levels. It will also support development institutions in assessing priority capacity development needs and developing appropriate investment strategies in the agricultural water management sector. At grass-roots level, the ultimate beneficiaries are farmers, farmers 'associations, service providers and rural communities that are currently experiencing serious economic and environmental difficulties

Production lines	Building blocks
1. Support for strategies Countries assisted in formulating sustainable agricultural water management strategies at regional, national and /or sub-national levels: • Identification of capacity development needs for improving the use and management of water in agriculture. • Formulation of up--to-date and sustainable agricultural water management strategies (within the scope of integrated water resources management and poverty reduction strategies).	• Needs assessment studies and action research • Workshops • Strategies and programme documents
2. Support for projects Countries assisted in the preparation of:- • Effective capacity building programmes and projects, and • Arranging funding (by bilateral and multilateral development aid).	• Project identification reports • Project formulation reports • Funding facilitation
3.Communication and advocacy • Information provision, and • Awareness creation, on agricultural water management issues.	• Integrated Information system • Periodical publications • Promotional documents

had established monitoring procedures that would allow scheme improvements to be reliably documented.

In terms of the financial sustainability of irrigation systems, the modernization process was generally found to be highly subsidized, - given that the high costs of investment and the low payment capacity of farmers. Such subsidies were justified by respective governments generally in terms of the rural development objectives associated with irrigation projects. However, no modernization projects had provision for maintenance by either governments or users, despite the large investment made. This considerably threatens the sustainability of the achievements made.

Finally, most of the modernization processes studied were part of national water policy reforms. Such reforms were sectoral in nature even when their driving force was high water scarcity. There seemed to be a lack of coherence between the different issues that have to be addressed - food security, water scarcity and increased urban, domestic, industrial use of water. Most of the modernization processes focused much more on ensuring water supply than on managing demand. More comprehensive approaches may be necessary, as water conservation and demand management are essential for the sustainability of water resources and the environment, as well as economic efficiency and social development. This is particularly true for governments of countries in multi-national catchment systems where there is potential for conflicting water needs – e.g. for the Jordan, Euphrates and Nile rivers.

Further details

The paper can presently be examined through the USCID (see www2.privatei.com/~uscid/uscid_pb.html for details). A joint IPTRID/FAO publication, with a complete analysis of the case studies, will be produced in 2004.

Cb-inventory – IPTRID's inventory of capacity building programmes for irrigation modernization

Maher Salman[1]

Irrigation modernization is increasingly seen as an important part of improving the effectiveness and efficiency of water resources management in the agriculture sector. There is a strong need to include training and capacity building in irrigation management initiatives so that the ability of irrigation professionals to introduce and deliver the needed modernization measures is enhanced. This conclusion has been reached in a number of studies, including those by FAO, The World Bank, UNDP, ICID and IPTRID.

IPTRID has been carrying out a worldwide survey of Capacity Building Programmes on Irrigation Modernization, and since 2002 has collected information from more than 75 institutes/organizations all over the world. The results of this questionnaire survey have been compiled in a database with web-based format. Thus IPTRID is able to provide online information about irrigation modernization opportunities.

Cb-inventory

The inventory provides information on more than 200 activities on capacity building for irrigation modernization, e.g. classroom/field-based courses, distance learning, workshops/seminars, virtual networking, exchange programmes, etc. The objectives are:

- to help find programmes on building capacity for irrigation modernization worldwide
- to provide relevant information about the programme - content, duration, target groups, etc.
- to enable host organizations to inform interested applicants and a wide audience about their programmes.

The CBinventory can be consulted at the web address: http://www.fao.org/iptrid/cbinventory.html
Additional information about the Inventory may be requested from the IPTRID Secretariat at: iptrid@fao.org.

Capacity Building:

"Capacity building is the sum of efforts to nurture, enhance, and utilize the skills and capabilities of people at all levels –local, national, regional, and international - so that they can better progress towards sustainable development.

At the basic conceptual level, building capacity involves empowering people and organizations to solve their problems rather than attempting to fix those problems directly.

When capacity building is successful, the result is more effective people and institutions better able to provide products and services on a sustainable basis."

UNDP, 1998.

IPTRID news

WCA infoNET - current situation

Maher Salman

IPTRID's WCA infoNET information system is an Internet-based integrated information platform which merges high quality information resources and expertise on water conservation in agriculture. It allows direct access to publications, documents, data, computer programs and discussion groups.

The system is fully functioning, and has 20 honorary editors, 2 researchers, regular inputs from major IPTRID partners and the services of a programmer working on maintenance and quality enhancement. It was recently upgraded with enhanced features and more stability. A new look design for the web-site that matches other IPTRID/FAO outputs will be released soon, as will a "library" version of WCA infoNET on CDROM. The amount of information stored on the system has increased by nearly 25% over the last three months. Most of the KOs (Knowledge Objects) are owned by the system, i.e. they are held on its server instead of being reached by a link to an external server.

WCA infoNET can be accessed as usual by its URL http://www.wca-infonet.org.

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IPTRID survey on selected cases of irrigation modernization and its outcomes

Sara Fernandez[1]

Many irrigation schemes world-wide suffer from poor management, both in technical dimension and social dimension. This often leads to unsustainable practices, decaying infrastructure and reluctance by users to contribute to maintenance of their schemes. Many irrigation schemes are caught in downward cycles of poor maintenance, poor water delivery performance, diminishing agricultural productivity and dwindling profits.

The gap between expected and actual performances has led different countries to undertake various types of interventions:

- technical and managerial improvements at different levels (farm, scheme, and watershed)
- institutional reform through the restructuring of irrigation agencies (such as the transfer of irrigation management to farmers' associations and/or private enterprises).

Experience shows that if these different interventions are not carried out in coordination with each other, they will not produce the expected results (Plusquellec, 2002[2]).

A critical aspect that hinders the transfer of management responsibility to farmers from Government, is their unwillingness to accept schemes that have deteriorated technically until it has been upgraded. Similarly, the introduction of new schemes, or the upgrading of existing technologies, often results in failures unless there is:

- provision for adequate training,
- adequate maintenance carried out,
- adequate longer term cost-benefit analyses,
- adequate legal and policy environments.

The concept of modernization of irrigation schemes gives rise to many interpretations, which demonstrate various levels of sophistication dependent on the different perspectives and professional orientations of water users and other stakeholders involved. For its work, IPTRID took the following definition of modernization as its reference.

Modernization

"Process of technical and managerial upgrading of irrigation schemes combined with institutional reforms, if required, with the objective to improve resource utilization (labor, water, economic, environmental) and water delivery service to farms" (FAO, 1997).

Old Alyarmook Project, Alyarmook Basin, Southern Syria Conveyance system after modernization (pressurized pipe system).

Survey on selected cases of irrigation modernization

In close collaboration with FAO, IPTRID is surveying current modernization processes taking place on irrigation schemes around the world (ranging from 400 to 50 000 hectares). Twenty case studies have so far been undertaken.

The main objective of the survey is to obtain a worldwide overview of the modernization process and its components. Terms of reference (prepared in English, French and Spanish) have been disseminated widely to national and local institutions in order to encourage them to undertake case studies. The aspects addressed comprise:

- description of the irrigation system before and after modernization
- reasons for modernization
- interventions in modernization
- impacts of modernization
- conclusions, comments, suggestions and recommendations.

The survey is helping to identify the different meanings and purposes associated with "modernization", the different levels of priority given to technical and managerial interventions, and the different national strategies and constraints associated with irrigation development. The case studies are available on FAO/AGLW web page: http://www.fao.org/ag/agl/aglw/watermanagement/

Irrigation modernization in North and West Africa – selected cases

Based on survey information from North and West Africa (Egypt, Jordan, Mali, Senegal and Syria), IPTRID provided a scientific paper[3] at the Second USCID International Conference on Irrigation and Drainage (Water for a Sustainable World — Limited Supplies and Expanding Demand), Phoenix, Arizona, May 2003.

Causes and interventions for the modernization process have been analyzed, as well as impacts on water service performance. The study showed that water resource shortage is an important cause leading to system modernization, but not the only one. Even when the potential water supply is not limited, institutional shortcomings and low crop economic productivity are also problems for which the modernization process is seen as a solution.

The modernization interventions investigated by IPTRID comprised technical improvements at on-farm, system and watershed level, coupled in some cases, with institutional reforms such as user reorganization. Capacity building actions accompanied these changes but were mostly at too low a level. The study found that if technical improvement and management transfer were implemented without adequate capacity building across the different management levels involved, the sustainability of the return on the investment (both financial and human) was limited. Capacity building is needed in order to provide technical staff and managers with the new skills and tools modernization requires.

Evidence shows that in all cases modernization brought improvements in water delivery efficiencies and water supply reliability. In most cases, these technical changes led to beneficial changes in water management service (flexibility, reliability, equity).

However, none of the systems investigated due to scarcity of water resources and poor agricultural water management practices. Increased prosperity for farmers and rural communities benefits overall national economies. Women in rural areas also benefit considerably given their active role in agriculture and water management.

[1] Associate Professional Officer (APO) – IPTRID
[2] Plusquellec, H. 2002. Is the daunting challenge of irrigation achievable? Irrigation and Drainage, 51 (3), 185-198.
[3] Fernandez S., Garces-Restrepo C. & Vidal A. 2003. Improving the water service in irrigation: a series of case studies on irrigation modernization. USCID Conference Proceedings Water for a Sustainable World — Limited Supplies and Expanding Demand, 12-15 May.

Programme implementation

The programme is implemented by the IPTRID secretariat, hosted in FAO and drawing on an international network of leading knowledge institutions and resource centres that can mobilise the expertise of a wide range of high-level experts in the field of irrigation, drainage and water resources management The network, led by FAO, counts among its members a growing number of centres of excellence such as IWMI, HR-Wallingford (UK), Alterra-ILRI (The Netherlands), Cemagref (France), DGDR-MAPA (Spain), IAM-Bari (Italy), USBR (USA), ICID, INRGREF (Tunisia), NWRC (Egypt), ICWC (Aral Sea Basin), EIER-ETSHER (West Africa). The IPTRID Secretariat works in close collaboration with FAO's Water Resources, Development and Management Service.

The programme is building a strong partnership with the donor community and governments. During the last ten years, IPTRID has been supported by more than 20 international organizations and government agencies, and has cooperated with more than 60 Country Partners in about 40 developing or transitional countries.

IPTRID Consultative Group

One of the largest meetings of the Consultative Group took place in Montpellier in September 2003 during the ICID 54th International Executive Council meeting. Over 25 donors and technical partners attended, showing that the recent review of IPTRID's direction is seen to be of significant interest. With Peter Lee as Chairman, the meeting generally accepted the new Partnership Programme for IPTRID, as presented by Olivier Cogels. It also heard an update of the last year's progress from Jean Verdier, and considered various suggestions by the partners.

Capacity development for smallholders, Senegal

In the Niayes region of Senegal, drip irrigation is becoming increasingly important because of its good water-use efficiency and high yields that are achievable. This is Senegal's most important horticultural area and provides 80% of the country's total requirement, but in recent years, it has started to suffer from water resource management constraints – (i) imbalance between water inputs (low rainfall) and outputs (high water extraction rates), and (ii) deterioration of water quality (due to intrusion of sea water into the water table and pollution from pesticides and domestic effluents).

Development of solutions to these various sectoral constraints, will involve strengthening capacities for improved agricultural water management. An IPTRID Mission, manned by cooperating partners FAO, IPTRID and MAPA (Spain) visited Senegal to assist the Ministry of Agriculture in identifying capacity-development needs in the smallholder irrigation sector, and to help identify a project that would strengthen capacities of the local smallholders. The mission centred on a workshop to develop an action plan for the development of micro irrigation in the Niayes area. The report prepared by the mission identifies the potential role of using local demonstration sites in the Niayes region to help develop drip irrigation techniques for different crops and for different climatic and soil conditions.

The irrigation challenge IPTRID Issue Paper No. 4

This paper written by Hervé Plusquellec, recently published by IPTRID, discusses the significance of increased contribution of irrigated agriculture to food and fibre production, despite the lower level of investment available for construction and modernisation of schemes. It argues that the food production shortages projected for the 1990s have been averted because of the explosion in groundwater use and the large improvements in water application efficiency over the last 30 years.

However, overexploitation of groundwater and degradation of water quality have been occurring in many parts of the world, particularly in semi-arid regions. This paper suggests that no further complacency is acceptable in addressing the long-standing issue of poor management practices in large irrigation systems. It argues that business-as-usual is no longer an option, and management practices as well as system design, must change to better serve the communities that depend on irrigated agriculture.

The irrigation challenge – increasing irrigation contribution to food security through higher water productivity from canal irrigation systems. (ISSN 1020-7376) Available on request from the IPTRID

APPIA - Improving irrigation performance in Africa

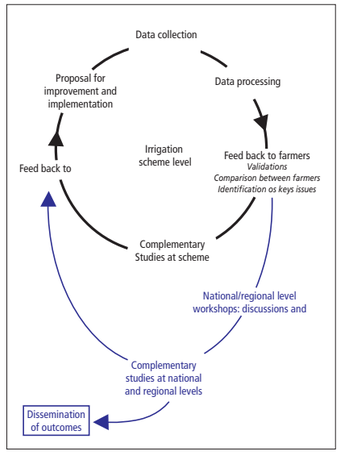
by Phillippe Lemperiere[1] and Ingrid Hermiteau[2]

Crop production in Sub-Saharan Africa is largely based on rain-fed agriculture, which increasingly depends upon unreliable and often insufficient rainfall. In response to an average annual population growth of 3%, and the fact that rain-fed agriculture productivity is limited, irrigation development is a major solution in terms of food security and alleviating rural poverty. However, only about 35% of potentially irrigable land in West Africa has been developed, and less than 10% in East Africa.

In response to the severe droughts that hit Sub Saharan Africa in the 1970's, many countries opted for irrigation development and made huge investments in government driven irrigation projects with the support of international donors. Change in world economic policy in the late 1980's, has led African governments to transfer, in some cases abruptly, irrigation management to farmers associations. At the same time donors have lost interest in irrigation, pointing out its lack of market competitiveness and cost effectiveness. Thus, improving irrigation performance (sustainability and profitability) is a crucial issue for bringing back investment to the irrigation sector.

In this difficult context, innovative and interesting initiatives have been carried out by various R&D projects, farmers organizations, irrigation authorities and NGOs. Unfortunately no information sharing mechanisms have been set up for these initiatives. More generally, the slackening of follow-up activities that accompanied irrigation management transfer no longer allows data-based assessment to be made of irrigation performance.

Due to their reduced level of preparedness, farmers associations have had a range of challenges to deal with: O&M; financial management; access to credit, inputs and market; diversification of crop production; and how to manage their natural resources. Consequently from the mid-1990's, extension services to farmers have started moving from a conventional approach, based on the dissemination of technical recommendations, toward a service that is more responsive to actual farmers' needs. These new forms of extension services, still very limited but growing in number, are characterized by innovative approaches:



Information sharing at scheme, national and regional levels

Target: Farmers organizations (rather than individual farmers)

Theme: Support to organizational management (i.e.: negotiation of contract agreements with other stakeholders)

Tools and methods: Participative approach, comprehensive assessment, and tools to facilitate the decision-making process

Institutional set-up: involvement of the private sector, payment to extension services.

There is thus a need to assess the changes in the present transitional period, and to clarify the concept of "extension service modernization".

APPIA

The APPIA Project includes five countries in West Africa: Burkina Faso, Mali, Mauritania, Niger and Senegal, and two countries in East Africa: Ethiopia and Kenya. Extension to other countries is being considered.

In West Africa, the APPIA Project is building on the lessons identified in the "Best Practices" project implemented by IPTRID in the same five countries. The project has been extended to East Africa so that it is not limited to French speaking countries. Also it promotes comparison of, and transfer of, practices between East and West Africa where institutional structures have evolved in different ways.

The project is financed by the "Fonds de solidarité prioritaire" of the French Government until 2007. In West Africa, the project operator is ARID (Regional Association for Irrigation and Drainage) based in Ouagadougou, Burkina Faso. In East Africa IWMI (subregional office for Nile basin and East Africa) in Addis Ababa is the project operator. Two French technical assistants have been seconded to ARID and IWMI respectively.

The purpose of the APPIA Project is to improve irrigation performance in the region by setting up networks for irrigation professionals to share experience and information. Two types of activity are underway:

1. Assessing and comparing the performance of small to medium scale irrigation schemes, and disseminating useful information, including:
   - The development of a methodology to collect and share information about irrigation performance and to implement solutions to improve irrigation performance.
   - The collection and processing of information by irrigation professionals in each country, about irrigation performance on a limited number of schemes.
   - Discussion about the outcomes, and dissemination in French and English among irrigation professionals at regional level.
2. Capacity building to support new forms of extension services that respond better to farmers needs within the context of (i) irrigation management transfer to farmers associations and (ii) a market oriented economy, including:
   - Thematic and case studies on the modernization of extension service to farmers' organizations, discussions on the outcomes, and dissemination among

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Environmental conflicts in irrigated areas: impact assessment in the Tunuyán river basin, Mendoza, Argentina

By Jorge Chambouleyron[1], S. Salatino1 et al[2]

Tunuyán catchment

Recent agricultural development of Mendoza's central oasis region is strongly linked to the flows available from the Tunuyán River. The river catchment is divided into a 54,000ha lower sub-basin and a 81 000 ha upper sub-basin, each with registered irrigation rights. In the early 1990s, there was a boom in agricultural development in the Upper Tunuyán River command area. Large investment in quality grapevines for winemaking brought about a rapid growth of the cultivated area. It also brought about considerable use of groundwater due to the requirements of pressurized irrigation systems. This study has focused primarily on what happens as the groundwater withdrawal intensifies. The concern is that stream flows from the upper area will diminish and salinity will rise in the waters of the Lower Tunuyán River. This will impact adversely on crop yields in one of the most important agricultural areas of the province. This article describes a study, financed locally by ANPCYT and SECYT, to develop solutions to this problem.

Upper reaches area of Tunuyán watershed

Typical landscape from a Mendoza farm

The problem

The environmental impact of current and potential development in the upper sub-basin on the lower sub-basin of the Tunuyán River has been assessed in a recent study by INA and Cuyo University. The main scenario investigated comprised a 20,000 ha expansion of the groundwater irrigated area cultivated with quality grapevines. This will lower the water table, deplete streams (which are tributaries to the river downstream from the Valle de Uco diversion canal) and effectively transform them into drainage collectors. The quality of water, which is used to irrigate crops such as peach trees and vineyards that are "sensitive" to salinity, is expected to be degraded. Reduced irrigation water supply in the lower oasis and increased water salinity levels will lead to soil salinization and reduced crop yields. Pollution in the irrigation water may be further worsened due to inadequate treatment of municipal wastewater – if the treatment plant capacity is exceeded.

The study

A multi-disciplinary research group studied the physical and socio-economic characteristics of the area – in terms of salt-water balance, irrigation water pollution, socio-economic description of the area, administrative and management aspects, economic aspects, and characterization of production models. Water quality samples were taken from:- (i) inlets to the upper area, (ii) outlets from the upper area (iii) upstream of El Carrizal dam (which is the physical division between the upper and lower Tunuyán basins), and (iv) at the Tiburcio Benegas dam (where irrigation water flows into the lower basin).

The cultivated area of the upper sub-basin was surveyed to collect socio-economic and cultural information. The study also focused on agribusiness conditions and profitability, farmer profiles, social aspects, and irrigation water management. Environmental impacts were identified, linked and qualitatively valued by means of an "importance matrix" which enabled the more significant negative impacts to be identified and quantified. This lead to an economic impacts assessment from which mitigation and control measures for the area were proposed.

Results

The study found that a sustained increase in cultivated area as well as in the economic activity of the upper basin would lower groundwater, would raise the salt content in the Lower Tunuyán River and would affect crop yields there. Results showed that a potential 20 000 ha increase of viniculture area in the upper basin would increase irrigation water salinity (currently at 1.13 dS/m) to some 1.42 dS/m. The available water supply would be reduced (200 Hm3), so that only one third of the registered area could be sufficiently supplied, and crop yields (of grapes and peaches) would be reduced by between 12 and 22%.

The economic impact assessment identified that soil salinization and water pollution in the Lower Tunuyán River area would lead to increased water demand for leaching, and would affect the productivity of the irrigated areas. Unless adequate measures are taken, the current 4 500 ha of peach orchards would be lost and grape yields would drop. The financial impact of the losses is estimated to be $20 million per year.

Income lost by farmers (in terms of unemployment compensation) would be in the order of US$684 000 per year). Farmers' contribution to the maintenance and modernization of their irrigation and drainage system would be reduced; and urban migration from the area would increase.

On the basis of these assessments, mitigation measures were developed to control the impact of uncontrolled growth and development in the Upper Tunuyán River. The measures are divided into "infrastructure components" (improvement of the canal system, rehabilitation of the drainage system, wastewater treatment, aquifer recharge, etc.) and "management improvement components" (consolidated basin administration, integrated register of uses and users, training and technical assistance to managers, and strengthening of the control system of surface and groundwater uses and users).

Recommendations

The outcome of the study were recommendations: (i) that water management be consolidated at the basin level; (ii) that water be distributed in a proportional and equitable manner on the basis of quality and salt content (as is the case of the Murray-Darling Basin in Australia and the Colorado River in the Province of Mendoza); and (iii) that groundwater be integrated into decentralised water management (with users' organizations assuming responsibility for water management and pollution control).

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[2] A. Drovandi, R. Medina, M. Zimmermann, M. Marre, R. Bustos, E. Antoniolli, M. Filippini, N. Nacif, S. Campos, C. Dediol, A. Camargo, D. Genovese (all at INA and/or Nat. Univ Cuyo)

The search for productive bio-Saline crops

The search for plants that grow naturally in a saline environment and can be economically cultivated, is still in its early stages. Initially the focus is on indigenous plants from tidal land. There is a question as to what these plants can be used for. As a source of fibre, oil, cattle feed, and specialised vegetables, seems to be the most promising use. Some successes have already been achieved with commercial cultivation of bio-saline crops as vegetables. Other plants that grow naturally in saline habitat have potential uses in coastal protection, erosion control and the production of ornamental plants and shrubs.

Limitations of salt tolerant or bio-saline crops

All plants and crops have a limit to their salt tolerance. They maintain an optimal production below the threshold salinity. If the salinity rises above the threshold value, production declines and eventually the plant dies. Determining the threshold salinity and the rate of production decline at increasing salinities above the threshold value is complicated by the variation of these values with the growing stage of the plant. (For instance, the salt sensitivity of plants is higher during germination and seed-forming stages, and can vary between varieties of the same species.) The figure shows the threshold value for three wheat varieties varying from a soil salinity of ECe= 2.1 dS/m for Forage Durum, to 8.6 dS/m for the semi dwarf varieties of wheat for grain production. This shows that the rate of decline of production – see the different slopes above the threshold value for wheat. The lists of salt tolerance for crops that have been published in many reports and papers, although useful for general purposes, do not give sufficient guidance for specific situations.

The consequence of all this is that if reasonable productivity is to be achieved, then soil salinity levels have to be maintained below a certain value during the growing cycle – whether this be for traditional species, salt-tolerant varieties, or bio-saline crops. Since the values fluctuate during the different growing stages, this means that water management practices and engineering infrastructures have to be adjusted according to the local situation.

Conclusions

- The use of salt tolerant varieties will enable more efficient water use and the development of new areas for crop production (which requires engineering measures combined with water management), but will not in most cases eliminate the need for salinity control. The basics of the methodologies and techniques for salinity control are well known.
- For the production of bio-saline crops, conditions with a controlled but higher than traditional, salinity level must be created. If the cultivation of these crops takes place in areas that can be put under influence of the tides, the tidal movements of the sea water can be used to control the soil salinity.

A definition of what different crops require in terms of soil salinity and general growing conditions, is essential to determining where the (new) crops can be grown and what measures have to be taken to create optimal growing conditions.

News from ICID

New ICID Senior Appointments

At ICID's 54th International Executive Council meeting held in Montpellier (France), 14-19 September 2003, three new vice-presidents were elected all of whom have had significant interaction with IPTRID.

Dr. Alain Vidal, at present, Head of Cemagref's European and International Affairs Office, was formerly IPTRID Theme Manager for Water Conservation in the Mediterranean and North Africa region.

Mr. R. Jeyaseelan, Chairman of the Indian Government's Central Water Commission (CWC), was involved in discussions between IPTRID and organisations such as CWPRS in identifying research priorities.

Prof. Victor A. Dukhovny, Director of Scientific Information Centre of Interstate Coordination Water Commision of Central Asia for Aral Sea (SIC/ICWC) is a long-standing member of IPTRID's Consultative Group and SIC/ICWC is presently working with IPTRID in studies and consultations aimed at determining a rational investment strategy for land drainage in the region.

ICID also announced at the meeting that Mr. M. Gopalakrishnan will take over as its Secretary General from 1st January 2004. He currently holds the post of Coordinator of Task Force on Interlinking of Rivers (constituted by Government of India), and recently retired as Member (River Management) in Central Water Commission.

New ICID information service

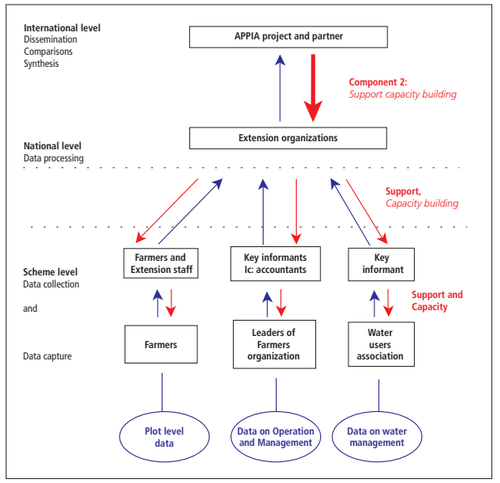
ICID's Text Delivery Service (TDS) has been running for 2 years, and now consists of almost 3,000 articles that can be viewed and downloaded online, as well as about 30,000 abstracts of ICID library holdings. Increasing numbers of users are making use of this online facility. 700 articles have been recently added to enrich the database, including:
- Transactions of 11th, 12th and 13th ICID Congresses, abstracts from ICID Irrigation and Drainage journal, and from many other journals and sources.

The system contains grey literature as well as the ICID library catalogue. These can all be searched through keywords, name of author, and (for books) title etc. Where a search shows that a document is available, it can be viewed/downloaded through "E-resource" button. If it is not available online, an "E-mail" button will enable users to get e-mail assistance in ordering on-line s that the document can be sent within two working days.

New software is being introduced at the ICID server to operate the text delivery service, which has several user-friendly features including open source standards. This means that the system can be freely customised as ICID sees fit, and it can link to similar databases (with Z39.50 protocol) on other servers. This means it will be it possible for a user in one system to search and retrieve information from another computer without knowing the search syntax it uses.

Http://www.icid.org.

[1] See: Croon F.W. 1999 "Institutional aspects of drainage implementation", ICID Drainage Workshop, Penang, Malaysia



Capacity building for extension staff and farmers organisations

irrigation professionals.
- Building-up of capacity in extension organizations– so that they can offer new services to farmers, and can promote tools and methods adapted for local conditions.
- Technical and institutional support given to Extension modernization projects.

The priority target for the project is the small to medium scale irrigation schemes managed by farmers' organizations. These schemes are more sustainable than large state farms, and are more efficient in alleviating rural poverty than private agro-industrial schemes. Selection of the type of irrigation to be investigated has involved consultation with all stakeholders, and identification of how comparisons can be made between various countries.

Beneficiaries

- Extension organizations and farmers organizations – who are both beneficiaries of, and participants in, the project. They are the main target of information and training courses. They will play a major part in the collection and the dissemination of information from/to irrigation schemes. Information and training will help farmers organizations to improve practices and performance at irrigation scheme level.
- Other irrigation professionnals – who will have access to information and training courses.
- Senior government officials – who will have more information to help plan irrigation development and to negotiate with donors.

Drainage & sustainability

Capacity building workshop for the Aral Sea Basin drainage strategy

One of the main environmental problems in the Aral Sea Basin region is the increasing salinisation and waterlogging of irrigated lands fed by the 2 main rivers Syr Darya and Amu Darya. Currently over 50 % of these lands are affected. There is an urgent need to develop pragmatic solutions.

IPTRID's workshop in Tashkent brought together senior technical experts from land improvement authorities in 4 CAS republics, in order to assess current land drainage trends in the region. The objective was to develop an overview of the present situation and the main constraints in land drainage. This information is being fed into a number of IPTRID facilitated studies carried out by ICWC, which will lead later in the year to a 2nd event, in which the basis for a rational drain strategy will be developed. This will be a High Level Conference towards a strategy of sustainable irrigated agriculture with feasible investment in drainage, in the Aral Sea Basin.

The workshop yielded 13 reports summarising present land drainage situations in the main irrigated areas of the region. These areas are generally known as oblasts, and included: Kzylorda oblast, South Kazakhstan oblast (in Kazakhstan); Kyrgyz oblast, Batken oblast (in Kyrgyz Republic); Sogd oblast, Kulyab oblast, Khatlon oblast (in Tajikistan); and Hunger steppe, Karshi steppe, Buhara oblast, Ferghana oblast, Khorezm oblast, Karakalpakstan (in Uzbekistan).

The workshop was held at the Scientific Information Centre of ICWC, Tashkent, as one of a series of workshops organised by IPTRID with DFID support. As well as the technical contributions of the participants, inputs were made by HR Wallingford and McGill Univ. (Brace Cent.).

Controlled drainage to improve water use efficiency in semi-arid areas

Cath Abbott[1] and Shaden Abdel-Gawad[2]

Irrigated agriculture uses about two thirds of all water abstracted from rivers and underground aquifers in developing countries, and in many areas available water resources are nearly or fully utilised. If irrigated food production is to increase, irrigated agriculture must use water more efficiently.

Research has been undertaken by HR Wallingford and the Drainage Research Institute, Cairo, to develop and test controlled drainage strategies that improve water use efficiency of surface irrigated agriculture in semi-arid areas. Loss of excess water through drainage is a major cause of inefficiency in some systems. Integrating irrigation and drainage management through the use of controlled drainage opens up new opportunities for water savings. This work was funded by the Governments of Egypt and UK (DFID).

Controlled drainage is a practice that allows farmers to control drainage outflows, storing water in the soil profile for use by the crop and reducing losses from the system. Drainage flows are managed so that drainflow occurs only after the ground water level in a field has risen to the point where drainage is needed to prevent crop damage, or to provide salt leaching. Irrigation applications can thus be reduced, and the relatively good quality water that is "saved" becomes available for use by downstream irrigators.

Whilst improved water use efficiency is the principle benefit of controlled drainage in irrigated semi-arid areas, there are other benefits, including:

- improvements in crop yield
- an increased insurance against crop losses due to water shortage
- maintenance of soil nitrate and phosphate levels, so that soil fertility is not degraded in high irrigation or high rainfall areas
- reduced nitrate and phosphate losses to downstream water bodies, reducing eutrophication of, and ecological damage to, receiving surface water bodies
- conservation of wetlands and water–sensitive regions.

It is particularly applicable to areas that experience periodic water shortages, and suffer from limits to crop production and high costs for water application. In terms of the basin water balance, the benefits are greatest where rice forms a significant part of the crop rotation, and also in areas where reused water is of poor quality.

The link between improved water use efficiency at farm level and water saving at basin level is not always clear. A water saving at field level does not always translate to a water saving at basin level, especially if water is recycled or reused once it has passed through the drainage system, or if groundwater recharge is a significant component of the basin water balance. In areas where significant volumes of agricultural drainage water flow out of the basin, or to sinks, then any increase in field water use efficiency directly benefits the basin in terms of water saving.

It is also important to consider water quality as well as quantity. In areas where drainage water is reused for agriculture, or other purposes (e.g.

Flapgate used in Egyp to block drainpipes and control drainage outflows

fish farms), it is common to find that the lower the water quality the lower the productivity of the reused water. Drainage water is inherently of poorer quality, and lower productivity is inevitable. For this reason, water savings at field level resulting in reduced drainage flows nearly always result in water savings (in terms of productivity) at basin level.

The following set of prerequisites apply to identifying land suitable for application of controlled drainage:

- Relatively flat agricultural areas.
- Surface irrigation is the main method of water application.
- Artificial drainage systems comprising a network of open drains or horizontal sub-surface piped systems with suitable access points (such as manholes) in place or planned.
- There is an incentive for introducing controlled drainage (such as water supply being sporadic or unreliable in the area, or the need to pump/lift water from canals to the fields.
- Crop patterns can be consolidated with respect to drain lines. (This implies that landholdings need to be relatively large, or that farmers are able and willing to collaborate over crop rotations.)
- Farmer organisations are willing to take on the organisational tasks associated with controlled drainage, or can be formed.

Egypt

Egypt is one of the countries where controlled drainage is most applicable, and offers significant benefits to the farmer and the wider community. The vast majority of the agricultural land is irrigated (most of it by traditional surface methods) and over 90% is served by artificial drainage systems. The extensive drainage network comprises open drains and horizontal sub-surface pipes, with many suitable access points for operation of controlled drainage. There are certainly areas where the incentives for controlled drainage will be attractive to farmers – this includes areas where sporadic water shortages impact crop production, and rice areas where savings in water application translate to considerable savings in energy and manpower costs. Farmer groups also appear to be sufficiently developed to facilitate management of controlled drainage across farming areas.

Agricultural production in Egypt relies almost totally on irrigation, so controlled drainage management can be driven by local irrigation applications. Simple controlled drainage devices have been tested that enable farmers to use weirs to reduce drainage flows, or in rice growing areas to apply flow blocking devices.

Farmers testing controlled drainage under rice in a number of Nile Delta areas have already achieved water savings in the order of 40%. The main attraction to them was the reduction in irrigation application times. As the water requirements for rice are much higher than those for dry-foot crops, the potential savings in water application from controlled drainage are also higher. Areas with rice included in the rotation are the ones that will benefit most from controlled drainage.

The use of controlled drainage under other crops is expected to increase as water resources across Egypt become more limited. Farmer groups within the Nile Delta are sufficiently developed to provide the collaboration required. The necessary support for controlled drainage management across cropped areas would be provided by a strong farmer extension service.

Other countries of potential application include India, Pakistan, Northern China, Uzbekistan, Tajikistan, Turkmenistan, Israel, Syria, Iraq, Bahrain and Algeria.

Project outputs:
A number of reports on the technical testing and potential use of controlled drainage are available. Further details from the authors

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Salinity control needs for salt-tolerant and bio-saline crops

by Frank Croon[1]

The challenge for the future development of salt-tolerant and bio-saline crops is in creating soil salinity conditions that are stable and within the threshold levels for good production. What these levels are depends on the characteristics of the crops chosen, but the principles on which this approach can be based are already well known.

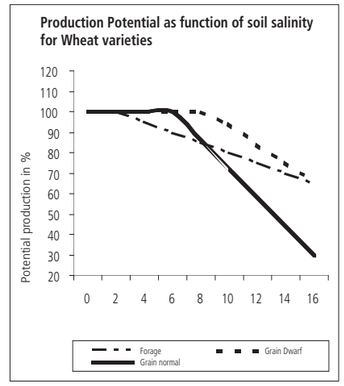
Bio-saline crops are generally selected from wild plants in tidal areas where the high, stable, soil salinity conditions are in balance with the salinity of seawater. Modifying tidal areas for agricultural production results in changes to the salinity of soil conditions, e.g. the exclusion of tidal inundation from coastal polders. Consequently soil salinity conditions will change and, if not properly controlled, can rise dramatically. The engineering challenge is to create an infrastructure that can maintain soils at an acceptable and stable salinity (such as making use of the stabilising capacity available from the adjacent seawater).

The agronomic challenge consists of (i) increasing the salt tolerance of the traditional crops while maintaining their productivity, (ii) selecting stable varieties of economically useful bio-saline crops and (iii) determining the condition under which they can thrive. This includes determining threshold salinity levels for new crops or new varieties as well as the environmental and climatic conditions.

Background

- Progressive salinisation of existing agricultural areas, especially the irrigated areas, is a major threat to agricultural production and has negative environmental consequences
- Salinity in coastal and delta areas, whether or not combined with the scarcity of fresh water, hampers agricultural productivity and development
- Soil salinity in areas adjacent to the sea are in balance with the salinity of sea water
- Considerable areas in arid regions cannot be brought into production not just because of water scarcity but also because of the potentially high soil salinities.
- Soil salinity is not static, but is a dynamic process that frequently results in progressive salinisation.

Halophyte plants – Salicornia.



The methodologies for solving salinity problems in reclaimed or irrigated areas are in principle well known and have been successfully applied to extensive areas on most continents, they comprise: leaching; increasing irrigation applications with a leaching fraction; and providing land drainage. In spite of this knowledge about how to use them, there are many institutional impediments1 and practical obstacles that limit their use, such as:- (i) scarcity of fresh water, (ii) high upfront costs of drainage, (iii) the requirement that large areas are dealt with in one go, (iv) the adverse impact on existing infrastructure, farming communities and agricultural customs, (v) the need for a consistent, disciplined water management and (vi) potential pollution of "downstream" areas by saline drainage effluent.

New approaches to dealing with these problems, and to making saline areas more productive, are starting to replace the more standard approaches:-

- Adjusting the crop to the existing environment (i.e. development of salt tolerant varieties)
- Productive cultivation of plants that grow naturally in saline environments i.e. bio-saline crops.

There is often an expectation that expensive and complicated engineering works (and related water and salinity management) can be avoided, and existing farming practices can be continued when salt-tolerant or bio-saline crops are grown. This is unfortunately not always the case - see below.

The search for salt-tolerant varieties of traditional crops

The creation of varieties of traditional crops that give moderately good yields under saline conditions in problem areas, is not simple. The threshold soil salinity values of most traditional crops vary in a narrow ECe range - from 4 to 8 dS/m. (The threshold value of a crop indicates the soil salinity value at which the crop starts to suffer yield reduction). The soil salinities occurring in coastal and salinised inland areas are often 4 to 6 times as high as these threshold values. Even barley, which is classified as one of the most salt-tolerant grain crops, has a threshold soil salinity (of 8 to 9 dS/m) which is considerably lower than the soil salinities of 20 to 40 dS/m that are often encountered.

Creating a suitable crop variety that can grow under the prevailing soil salinities in problem areas requires a huge jump in salt tolerance – something that is NOT just around the corner, if at all possible. So the use of salt-tolerant varieties is not going to be a universal solution for the large-scale salinity problems that are threatening world agriculture.

There are however important advantages to the cultivation of crops that have a higher salt tolerance than the traditional varieties. If crops can tolerate higher soil salinity levels, they will need less water, because leaching ratios can be reduced. Furthermore, the system would perhaps be less sensitive to occasional mishaps or seasonal fluctuations – so water and salt management could be less stringent than would otherwise be required.