

Minutes of the Second Meeting of the  
**WORKING GROUP ON TECHNOLOGY AND RESEARCH UPTAKE AND EXCHANGE (WG-TRUE)**  
 New Delhi, India  
 06 December 2009: 14.15-18.00 hours  
*Strategy Theme: Knowledge*

**Year of Establishment: 2007**

**Completion of the Mandate: 2011**

**Mandate:** To support research and development of technology and innovation processes for improved irrigation and drainage

**Members Present:** (1) Prof. L. Vincent, Chairperson, 2007 (The Netherlands, 1995); (2) Prof. J.G. Annandale (South Africa, 2003) represented by Dr. Gerhard Backeberg; (3) Mr. Geoff Pearce (UK, 2003) represented by PH Peter Lee; (4) Mr. Ezzatollah Farhadi (Iran, 2005); (5) Dr. Mohammad Che Hussain (Malaysia, 2005); (6) Mr. Stephen Mills (Australia, 2005) represented by Dr. Willem F. Vlotman; (7) Dr. Enrique Playan (Spain, 2006) represented by VPH Dr. Jose A. Ortiz; and (8) Er. M. Gopalakrishnan, Secretary General, ICID.

**Permanent Observers:** PH Peter Lee (UK)

**Members Honoraire Present:** (i) President Dr. Chandra Madramootoo (Canada); and (ii) VP Dr. Hafied Gany (Indonesia).

**Contributed by mail:** (i) Dr. (Mrs.) Shaden Abdel-Gawad (Egypt), (ii) Dr. John A. Replogle (USA); and (iii) Prof. Yuanhua Li (China).

**Observers:** (i) Prof. Dr. Kazumi Yamaoka (Japan); (ii) Mr. François Chrétien (Canada); (iii) Mr. Indra Raj (India); (iv) Mr. Syaiful Mahdi (Indonesia); (v) Mr. Mehrzad Ehsani (Iran); (vi) Mr. A.K. Bajaj (India); and (vii) Mr. K.N. Sharma, Central Office.

**Website:** <http://www.wg-true.icidonline.org/>

**Item 1 : Confirmation of the minutes of the 1<sup>st</sup> meeting held on 15 October 2008 in Lahore, Pakistan**

The minutes of the 1<sup>st</sup> meeting of the Working Group held at Lahore were confirmed.

**Item 2 : Review of membership, including new nominations**

Two new nominations were tabled at the meeting with nominees present, and accepted at the meeting:

The new members are - Dr. Kazumi Yamaoka (Japan) in place of Dr. Yohei Sato and Mr. Indra Raj (India) in place of Mr. S.K. Chaudhuri.

The work by the Central Office (CO) to systemise membership from the merger of the previous committees AC-IPTRID and WG-R&D was recognised and has helped clarify membership. From Egypt, Dr Shaden Abdel-Gawad is Vice-Chairperson and Dr. H. Fahmy is now an Observer with the WG. India now has a new member. The WG-Chair and Central Office corresponded with members - Prof. Jiesheng Huang and Prof. Yuanhua Li who respectively attended in 2008 and sent comments to the questionnaire in 2009.

The Central Office has been in correspondence with NCs about a number of members of the two committees who have not attended or been in correspondence for 3 years now, to request their participation or replacement. These are Mr. J. Lelkes (Hungary); Mr. Sietan Chieng (Canada); Mr. Alain Delacourt (France); VP L. Ubertini (Italy).

**Item 3 : Mandate of the Working Group**

The WG discussed the existing mandate for WG-TRUE given at the Sacramento meeting which is “To support research and development of technology and innovation processes for improvement of irrigation and drainage”. It was debated whether this should be expanded to include reference to technology uptake. The WG agreed to keep this mandate as its simplicity was valued. The Chairperson will formulate objectives for this mandate and related key themes for the work programme, that serve to specify this mandate and also show the work on technology uptake.

For this work, it was suggested to look at the older programmes proposed under AC-IPTRID and WG-TRUE, and the recommendations from the Lahore WG meeting, but also at the recommendations of the IPTRID Biennial review. However, a focused work programme was needed for the WG at this time. For information the older recommendations (Item 5 of the agenda i.e. work plan) are kept as **Annex 1** for reference.

Two objectives proposed in the discussion were:

- to support R&D (which looked more at innovation processes)
- research to improve irrigation and drainage, where impact of research was noted as a particular concern

The Chairperson agreed to develop this formulation with members, and use it as a guide to call for papers for the work programme.

Quite some discussion followed regarding research on irrigation and drainage. Topics seen as important to members and observers included:

- research on tools that facilitate the production and productivity of crops
- facilitation of modernization, or more widely research that facilitate modernization;
- farmers' participation in research

The Chairperson will follow up on the second topic with the WG-Modernization of Irrigation Systems.

**Item 4 : Tenure of the Working Group**

The WG confirmed its four-year tenure for completing its mandated plan.

**Item 5 : Activities of the WG-TRUE**

The WG decided to aim for two work activities at this moment. The first will be a workshop at the 2010 meeting, during its WG session. A second will be a further set of papers, to be presented either in the WG 2010 meeting, or presented as under sub-questions in the 2011 Congress.

Members present identified topics they could develop presentations for 2010, as follows:

- Prof. Vincent – Farmer uptake sprinkler technologies in Peru
- Dr. Yamaoka - Technology facilitating communication between farmers and service agencies
- Mr. Indra Raj - The development and impact of agro-meteorological forecasting for irrigated production
- Dr. Muhamud Che Hussain - Understanding lack of technology uptake
- Mr Farhadi – Research on needs to improve production and productivity

Topics will be sought from other members and other ICID members working in fields identified under item 3 and also in relation to case studies cited in questionnaires (item 5.4)

**5.3 Follow-up from the World Water Forum**

These were not discussed specifically. The Group recommended to stay on a focused field of key work for its remaining tenure period as discussed above. However, it is recognized that the mandate of WG-TRUE links particularly with items 2B and 3B of the ICID Synthesis of Topic 2.3 Annex XVI of agenda.

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#### 5.4 Responses to circulated questionnaire

During the first meeting held at Lahore, members/observers expressed it would be beneficial to collect experiences by inviting National Committees'/Members'/Observers' view points through a questionnaire/survey. Accordingly, the Central Office prepared a questionnaire and circulated it amongst all National Committees/ Workbody Chairs/ Members of WG-TRUE in March 2009 with a request to provide as much information as available. In response, the Central Office has received two filled-in questionnaires, from Prof. Yuanhua Li (China) and Dr. Enrique Playán (Spain), a member of WG-TRUE. In July 2009, the Central Office once again circulated the questionnaire among all National Committees/ Workbody Chairs/ Members of WG-TRUE for their experiences. In response, filled-in questionnaires were received from Dr. John A. Replogle, Secretary, WG-TRUE (USA); Renato S. Gamboa (Philippines); Dr. José A. Ortiz Fdz.-Urrutia (Spain) Mr. Mehrzad Ehsani (Iran); and PANCID/ IWASRI.

These inputs were appreciated but were small in number. They were compiled by the Chairperson under the headings of the questionnaire and discussed at the meeting. These questionnaires showed responses from countries with different structures and processes used in research, as well as a different problems focus and relation to farmers as shaped by a countries irrigation management context. The final edited compilation is attached as **Annex 2** to these minutes and circulated to members. It will also be followed up for further presentations for the work programme on the WG. A further questionnaire response may follow from the Iranian NC.

#### 5.5 Revamping IPTRID

Observer, President Hon. Peter Lee announced that IPTRID in its older proposed structure has now ceased to exist, and currently is an FAO sub-organisation without a manager. There will be a fresh initiative from the President ICID to revitalise a new independent programme focused around technology research. The WG-TRUE welcomes this initiative, gives its support to it, and offers to help where it can in. The WG will also aim to collaborate with new programmes.

#### Item 6 : Website of WG-TRUE (combined)

This is under development. Past papers from special sessions will be loaded on the website.

#### Item 7 : Presentations by WG members

New member Mr. Raj gave a brief summary of his work and of research institutes relevant to the field of the WG in India. He also circulated:

- the list of Indian Council of Agricultural Research (ICAR) institutions under which are listed Deemed Universities, National Research Centres, National Bureaux and Directorates/Project Directorates. <http://www.icar.org.in/node325>
- the list of projects of the Indian Agricultural Research Institute. [http://www.iari.res.in/inst\\_projects.php](http://www.iari.res.in/inst_projects.php)

New member Dr. Yamaoka also gave a brief summary of the organisation of research and how farmer actions and requests led to the development of Land Improvement Districts.

Dr. Ortiz provided more detail on the COREGEST and CORENET information systems mentioned by him and Dr. Playán in the questionnaire responses from Spain.

Information was also presented for discussion from Malaysia, Iran and South Africa. These points will be compiled alongside older information on research structures and approaches with the WG R&D.

#### Item 8 : Any other business

**8.1** Mr. Sharma (Central Office) observed that the present mandate of the WG did not reflect research 'exchange' part, which included education and capacity building and asked whether the WG would look into this in the light of the name of the Working Group. The education, training and capacity building aspects which are important, were earlier dealt with under the WG-CBTE, which has since been wound up. The Chairperson felt that the scope of the subject of 'education' was very wide and it will be difficult to include it in the mandate of the WG-TRUE.

The CO tabled a MoU for Bilateral Collaboration between ICID and UNW-DPC in the field of Agricultural Water Management. It has a sub-objective focused on 'Efficiency in agriculture' the specifics of which were not detailed in the meeting. The WG-TRUE recognised the value of the MoU but saw this as a very broad topic for it which earlier would have been covered by the erstwhile working groups on Capacity Building and Performance. Observers noted there was a difference between technology research which required understanding of the needs of users and systems, and capacity building which should focus on the needs of the people using the technology. The WG recommended that this be discussed further at the PCTA, who might recommend an initiative that contacted ex-Chairmen and members, and used the output and interests of the ex-WGs on Capacity Building and Performance, and also drew on a Special Sessions organised around this new focus area, for example the UK-ICID session on the Political Ecology of Irrigation Efficiency and Productivity. This could be a new Task Force that helps fill out the work under the new MoU.

**8.2** The following information from Central Office and members was received:

1. Member John Replogle has circulated information on irrigation guides and papers relevant to the field of WG-TRUE from meetings he has attended (Irrigation Association: Irrigated Agriculture Common Interest Group; IAHR Congress; USCID Conference). The Chairperson will be in contact to consider if links to relevant papers can be put on the website.
2. On an International Workshop on "Capacity Development for Farm Management Strategies to Improve Crop-Water Productivity using AquaCrop" held 25-29 October 2009 at the Agricultural Research Center (ARC), Ministry of Agriculture and Land Reclamation in Cairo, Egypt. The workshop was jointly organised by Food and Agriculture Organization of the United Nations (FAO), UN-Water Decade Programme on Capacity Development (UNW-DPC); and Soil, Water and Environment Research Institute (SWERI). The main objective of the workshop was to train the participants in the practical applications of AquaCrop in order to improve their skills in strategic farm management practices towards increasing crop water productivity in rainfed and irrigated production systems. For more information, please visit the webpage of <<http://www.unwater.unu.edu/>>.

In the meeting, members noted that more training sessions on Aquacrop are being organised regionally, and that this could be a topic for discussion in the WG.

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**WORKING GROUP ON TECHNOLOGY AND RESEARCH UPTAKE AND EXCHANGE  
(December 2009)****Activities proposed for WG-TRUE****5.1 Documenting Technology Innovations and Research Processes (activities with AC-IPTRID)**

At the Lahore meeting, the WG noted AC-IPTRID's suggestion to provide a two-way flow of information and discussion on research needs and technology innovations, and develop a programme for WG-TRUE based on:

- Documentation of research uptake process for at least two countries of Africa and Asia.
- Documentation of I&D technological innovations and adaptation for two countries of Asia and Africa.
- Joint IPTRID-ICID publication on value of technology and research uptake in developing countries.
- Joint policy briefs based on R&D results in selected countries.

**5.2 Studies on R&D processes (from WG-R&D and beyond)**

The WG observed that the items carried forward from the erstwhile workbody can include the following:

1. The value of R&D in irrigation and drainage practice, and benefit to research
  2. Cooperation between key organizations supporting and undertaking research and innovation
  3. Outreach, communication and research uptake
  4. Improved understanding of research and innovation processes, in particular of:
    - Understanding and transforming timeframes from research to innovation
    - Identification and working with stakeholders' needs and interests, and complex problems
    - Leadership, structure and networking in research, especially linking national and local action, and
    - Capacity building for research
1. How research models and data can be better used in capacity building, and system design and water management practices – how to move between theory and practice, and
  2. Financing of research and innovation, especially to reach certain stakeholders and problem contexts.

During the Lahore meeting, it was emphasized that the development of water management infrastructure is very expensive but it is possible to link the research activities/benefits to the infrastructural developments. The WG also noted that there was a tremendous scope for reducing the associated costs. Such types of experiences from Iran, India, and Pakistan were highlighted during the Lahore meeting respectively by the observers, viz. Dr. K. Yella Reddy (India), Dr. Wouter Wolters (The Netherlands) and Mr. Ezzatollah Farhadi (Iran).

It was mentioned that it would be appropriate to look into matters such as:

1. How research could help to improve management experience for developing operation of irrigation systems;
  2. Actual amount of water requirement of crops and how water can be applied to the crops efficiently; and
  3. Advantages of carrying out drainage activities in the field.
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**WORKING GROUP ON TECHNOLOGY AND RESEARCH UPTAKE AND EXCHANGE (WG-TRUE)  
(COMPILED December 2009)**

**Replies to Questionnaire for WG-TRUE**

Compiled 5 December 2009

Replies from: Iran: Mehrzad Ehsani; China: Prof. Yuanhua Li; The Philippines: Renato S. Gamboa; Spain: Dr. José A. Ortiz Fdz-Urrutia, Dr. Enrique Playán; Pakistan: PANCID/ IWASRI; USA: John Replogle

1. Do you agree that it is possible to link research activities /benefits to the infrastructure developments in irrigation and drainage sector?

All said yes.

Yes/ No
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2. If yes, what is the role played for:

**(i) Reducing associated cost: Explain facts findings through case studies**

**Iran:** Comments relate to research in the CP project in Karkheh River Basin (KRB) associated cost is of research is decreasing significantly. Most part of the research has been on activities including land preparation, sowing, irrigation, input cost, etc. The researcher should convince the farmers about his yield and support the farmers if the yield in experimental area was less than average yield in his farm. In most cases, the equipment needs for monitoring the farming activities and data collection must be supported by the researcher's organization. In our study, we informed by the farmers a day before irrigation and we were on the farm for recording the water inflow by a WSC flume.

**China:** Sediment is a big problem, especially in the Yellow River (YR) basin which is the most water scarce region. However, implementation of some WSI practices is impacted by the high sediment content of water. On the other hand, the movement and distribution of sediment should be considered when operating the canal systems. The infrastructure development for irrigation needs research. Anti-frost measures for canal is very costly. The infrastructure development benefits directly from the research.

**Philippines:** Proper operations (introduction of a pattern of planting and fixed rotational irrigation schedule along a stretch of delivery canal) in a crop year cycle (wet-dry season) reduced operation interference by farmers, reduced instances of high velocity flows in sections of control structures and reduced occurrences of scouring of canal embankments and silt formations. This reduced the need for periodic de-silting of canal sections.

Downstream the start of planting during the wet season resulted in an increase in planted area during the dry season even with the same amount of water diverted in the crop year (wet-dry season) cycle. The downstream section was planted to 800 hectares in 1975 dry season compared to 300 hectares in 1974 dry season. This was experienced in the NIA-IRRI Water Management Pilot Project in Penaranda River Irrigation System in Nueva Ecija, Philippines in 1975. The rationale of the pilot project was 'improving irrigation systems performance with less rehabilitation/repair costs'. This experience was replicated in other irrigation systems. In Amburayan RIS in the early 1990s, the 5-year cropping intensity average before scheme implementation was 144% and the 3-year average after introducing the scheme was 177%. That is a 43% increase equivalent to additional area of 1,470 hectares. Similar experiences were found in Tarlac-San Miguel-O'Donnell RIS, also in the 1990s.

**Spain:** Research can instruct decision makers about the usefulness and cost effectiveness of investments in specific structural developments. Decision makers are not always aware of the user's acceptance of technology. For instance, in Spain a very serious effort has been adopted to implement remote control / remote monitoring capacities for collective pressurized irrigation networks. Applications for such structures were not ready, the quality of the communication was in general not yet fully satisfactory, and the irrigation sector was not mature enough to use such devices. As a consequence, investments have not produced the expected benefits.

The information system CORENET/COREGEST application focuses on:

- Reducing personnel costs associated with the ordinary management tasks of an Irrigators Community (water allocation, invoicing, infrastructure maintenance, accounting, etc)

- Reducing the use of water by improving its management procedures;
- Reducing the energy costs by improving both the use of water and the management procedures of the energy involved in its use.

**Pakistan:** Research on sub-surface and interceptor drainage under Fordwah Western Sadeqia South (FESS) project, Bahawalnagar, helped in reducing the cost of FESS, Khushab and Mirpur Khas projects.

**USA:** I have no case study to offer. Considerations include reducing costs associated with reliance on outdated technologies. Some conveniences and application accuracies can perhaps be economically improved with mechanization—not necessarily complete automation—including newer, low-cost communication links.

**(ii) Improving crop yields and water savings by way of adopting appropriate cropping patterns/ irrigation methods/practices: *Explain with facts findings through case studies***

**Iran:** In the CP project in Karkheh River Basin (KRB) we conducted a research at on-farm level to improve the irrigation and farm management. In those fields, wheat was in rotation with maize. The treatments were farm size, seeding rate and irrigation inflow. In the results, the crop yield did not improve significantly, but irrigation water applied decreased and maize water productivity increased from 0.3 to 0.6 kg/m<sup>3</sup>. The treatment shows a change of 0.6 and 1.0 kg/m<sup>3</sup> for wheat. In the next year, farmers followed their experience and controlled the plot size, seeding rate, land preparation, and irrigation management accordingly.

**China:** Since the mid-1980s, many studies have indicated that significant savings in quantities of water used in traditional rice culture were possible without a distinct reduction in rice yield. It was indicated that it is necessary keeping shallow ponded water until the middle stage of rice tiller, and then alternate wetting and drying (AWD) irrigation does not give negative impacts on the growth of rice if the water content in the root zone is not lower than 70% to 80% of the saturated moisture. The AWD practice has been adopted widely in China.

**Philippines:** Organized pattern of planting ensure that growth stages of crops in certain section or irrigation units are at common stages, hence the appropriate water saving scheme adopted to such growth stage, can be generally applied. Water savings are done in two ways: a) controlled irrigation (CI) – at delivery points such as head gates of secondary canals and turnout gates; and b) alternate wet and drying (AWD) at farm level. Water savings technology (WST) can be done on an area-wide basis by implementing in the irrigation system at the start of the wet season a pattern of planting that ensure that crop growth in an irrigation unit is at common stage that will fit a certain level of water application.

**Spain:** Research can help improve farmers' performance for instance by supplying guidance to irrigation scheduling. The local differences in crop yield and water use are very often the consequence of differences in irrigation scheduling. In all irrigation methods, irrigation decisions have a clear effect on the economic and hydrologic performance of a farm. Research can assess the cost-benefit ratio of each irrigation event, and can guide farmers to apply crop water requirements throughout the season. The effect of soil and environmental variables on irrigation performance is not fully understood by farmers. Many farmers do not have access to adequate information on evapotranspiration and on irrigation efficiency. This information is common knowledge in technology-rich environments, such as research campuses.

CORENET/COREGEST is currently in use by more than 200 Irrigators Communities in Spain. The applications are mostly used to improve water and energy savings by means of:

- Better water management practices which are possible through the powerful information management systems of CORENET-COREGEST
- Real time indication of energy costs associated with the use of water, and indication of the overall “energy efficiency” of the irrigation network which leads to a change in the management procedures to save energy.

**Pakistan:** Research in cropping pattern, water conservation technologies and sprinkler/drip systems helped in improving crop yield and water savings in Mona reclamation experimental project, Bhalwal.

**USA:** Again, I have no case study to offer. Improving application uniformity with appropriate soil moisture and crop-related application amounts is expected to increase marketable yields. New crop varieties are becoming available, but may not be used because of legal restrictions or initial expense of obtaining the crop variety. An example of

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legal interference is the disease-resistant wheat variety in Africa, that so far is not being offered to world wheat breeders.

**(iii) Implementing better operation and management: *Explain with facts findings through case studies***

**Iran:** CP project in Karkheh River Basin (KRB) This study had a significant impact in the selected site. Accordingly, seeding rate application by the farmers improved (decreased), the runoff decreased especially in maize fields and water productivity increased about 50-100%. The seeding rate decreased from 250-300 kg/ha to 150-180 kg/ha. The length of the farm (*field and irrigation furrows?*) was near to 300m which was high regarding the farm slope. This was a reason for high inflow rate to the farms and considerably high runoff. The farm length optimized based on the soil and slope.

**China:** The Master-cards have been used and proved popular in water scarcity regions in China for controlling groundwater pumping.

**Philippines:** Irrigation system operations management must consider the wet-dry season cycle. Wet season initial operations in terms of pattern of planting will also define the possible pattern of planting during the dry season. Downstream start-going upstream planting in an irrigation system during the wet season will result also in a downstream start-going upstream planting during the dry season. First to plant in the wet season is first to harvest and has the first opportunity to plant the dry season crop. Hence, at the end of the dry season when the supply of water from river sources is at its minimum, area still to be irrigated are at the upstream portion of the irrigation system.

**Spain:** Our research group has been involved since 1998 in the development of a software for irrigation district management named “Ador”. In its nine years of life, the software has been applied in more than a hundred irrigation districts, servicing about 200,000 ha. Farmers’ organization have found in Ador tools to manage irrigated land, land use, crop distribution, water billing, water balancing, local and regional water use planning and accounting. The success of this project relies on a rare blend of farmers’ organizations, extension services and researchers. More information on the Ador project can be found in:

Playán, E., Cavero, J., Mantero, I., Salvador, R., Lecina, S., Faci, J. M., Andrés, J., Salvador, V., Cardeña, G., Ramón, S., Lacueva, J. L., Tejero, M., Ferri, J. and Martínez-Cob, A. 2007. A Database Program for Enhancing Irrigation District Management in the Ebro Valley (Spain). *Agric. Wat. Manage.*, 87(2): 209-216.

CORENET-COREGEST offers a set of standardized management procedures for Irrigators communities which produce the following benefits:

- Easier and better task allocation to the personnel at all levels (management, workforce, etc)
- Easier training procedures
- Interchangeability of personnel linked to the “de-personalization” of management procedures.

In parallel, CORENET-COREGEST offers powerful data mining and business intelligence functionality, which is specially useful to support management decision making.

**Pakistan:** Research on maintenance of surface drains proved that half of the drainage needs can be reduced by regular cleaning of surface drains, in a study done under WAPDA.

**USA:** I hope someone can site practices that are being used successfully and which can translate to a broad population of users.

**(iv) Formulating policies and framing up of institutional/organizational set up: *Explain with facts findings through case studies***

**Iran:** CP project in Karkheh River Basin (KRB) there was a local water organization which just allocated the water based on the size of the field and water availability. They usually consider an average efficiency. There was no control on irrigation efficiency at farm level. There was also a local agricultural office which controlled soil fertility every year by allocating fertilizer and other inputs between the farms. The local agricultural office does not educate the farmer about irrigation management, land preparation, irrigation scheduling, etc mainly because they have no

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control or schedule on water allocation. Water allocated by the local water organization is non-scheduled. Accordingly, farmers receive the water when the fields do not need it and vice versa.

**Philippines:** Irrigation systems must be operated by agency personnel and farmers thru their organizations (IA, WUA, etc.) along the following principles:

1. Water rights – all farms within the irrigation system has same right to water regardless of the farms proximity from the water source;
2. Fair and equitable sharing of burdens, efforts, resources and benefits at all levels of the organizations – from the agency head to the level of the farmers; and
3. Open, transparent and participatory process of governance of all irrigation affairs.

**Spain:** Research efforts on water quantity and quality in the Ebro Basin have led to the formulation of water use policies. These have been distributed to decision makers in a symposium organized by the regional government. Additionally, an International Scientific paper presents policy formulation from the point of view of its scientific basis:

Albiac, J., Playán, E. and Martínez, Y. 2007. Instruments for water quantity and quality management in the agriculture of Aragon (Spain). *International Journal of Water Resources Development*, 23(1): 147-164.

When it comes to irrigation modernization and the scientific basis of its hydrological effects, an effort has been performed to analyse the case of Spain and distribute the results to the water authorities. A scientific paper on the topic has been internationally presented:

Playán, E. and Mateos, L. 2006. Modernization and optimization of irrigation systems to increase water productivity. *Agric. Wat. Manage.*, 80(1-3):100-116.

This paper was the basis of further local studies on the issue. For instance, the Ebro basin Water Authority requested a study from the research group on the effect of irrigation modernization on basin-wide water availability and quality. CORENET-

COREGEST holds a database of irrigation data corresponding to a large number of Irrigators Communities. This data can be used by institutional organizations to support policy formulation. The data is also of use for R&D organizations to support its work.

**Pakistan:** Research in canal lining and interceptor/subsurface drainage under IWASRI helped in policy shifts with reference to new projects by the Government of Pakistan.

**USA:** This is usually not as easily accomplished, as it would appear. It too often requires settling age old battles among neighbouring farmers with the attendant longstanding distrust.

**3. If no, what is the reason behind it? *Explain with facts findings through case studies***

**Pakistan:** Explain with facts, findings through case studies.

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