SHORT COURSE

SEPTEMBER 10-21, 2008
UNESCO-IHE
DELFT, THE NETHERLANDS

SHORT COURSE ON

# SPATE IRRIGATION AND WATER MANAGEMENT UNDER DROUGHT AND WATER SCARCITY

Spate Irrigation Network

META

UNESCO-IHE
Institute for Water Education

# SPATE IRRIGATION AND WATER MANAGEMENT UNDER DROUGHT AND WATER SCARCITY

**Spate irrigation is an ancient form of water harvesting and managing unpredictable and sometimes destructive flash floods for crop and livestock production. The system is unique to semi arid and arid areas where it has existed for over 70 centuries. Today spate irrigation is still the major source of livelihood for many poor communities in South Asia, the Middle East and North Africa, whereas the area under spate irrigation is on the increase in the Horn of Africa and other parts of Sub-Saharan Africa. Despite being the oldest type of irrigation, however, it is still the least studied, understood and documented.**

There have been some efforts to improve the productivity of spate irrigation, with mixed outcomes. For a long time the main approach was the modernisation of traditional earthen structures with concrete headwork. Experience with this approach has not always been positive and typical issues are the inability to effectively manage sedimentation, the disturbance and imbalances in water distribution and the difficulties of maintenance. Other projects have had a less ambitious outlook – and have worked with improved traditional flood guiding structures retaining the original distribution of water over a series of intakes, improving the manageability of water within the command area and emphasising breakthrough in soil moisture conservation and crop agronomy. Though one can not generalise, such approaches have had more encouraging results that highlighted the considerable scope to reach high productivity in spate irrigation and thus make significant improvements in poverty alleviation and local food and income security.

## LEARNING OBJECTIVES

Upon competition of the course, the participants will be able to:

- Comprehend best global and regional practices in spate irrigation taking a broad integrated water resource management view;
- Draw spate irrigation development and management plans covering technical designs; institutional, socio-economic, environmental and legislative attributes;
- Understand alternative approaches for diverting spate flows - looking at where to divert flows, how to manage large floods with detrimental sediment loads;
- Design, manage, operate and maintain alternative on-farm structures and assess their effects on field water management and soil moisture conservation;
- Systematically analyse the impact of alternative field management, soil moisture conservation, and agronomic practices on crop yields;
- Grasp various experiences of groundwater recharge in spate irrigation - in particular, the effect of different water distribution structures and strategies;
- Conceptualise and apply SWAM and CROPWAT models;
- Link engineering and management improvements with changes in water governance and local organisation.

## COURSE CONTENT DESCRIPTION

This two-week short course is organized into six modules: an introductory, four cores, and an assignment and field trip module. All external (from outside of UNESCO-IHE) participants should have to register for all six modules.

UNESCO-IHE participants can select one of the following options:

- The whole two-week programme
- A one-week programme: consists of two core modules, 2 and 3, or 4 and 5, and the compulsory introductory, and group assignment and field trip modules.

### 1. INTRODUCTION

Terminology and definitions; typology: size of systems, type of infrastructure and its operation and maintenance, sources of water, nature and type of organisations. Economic costs and benefits of investment in improvement and modernisation of floodwater harvesting and distribution structures, groundwater recharge as well as provision of earth moving machinery. Social and environmental benefits: food security improvement, creation of labour opportunities, reduction in seasonal migration, enhancement of water supply for humans and livestock, rangeland and forest restoration and regeneration. Best global and regional spate irrigation development and management practices that take into account the broader view of integrated water resource management.

### 2. SPATE HYDROLOGY AND ENGINEERING

Spate hydrology: various discharge estimation approaches for wadis (ephemeral rivers) and canals. spate flow duration - discharge correlation hydrographs. Spate engineering: new conceptual and structural design approaches for managing sedimentation processes, avoiding erosive scour, guiding huge sudden volumes of water over larger areas and where possible combining spate irrigation and groundwater recharge. Typical structures are traditional weir and deflector type low earthen and gabion bunds, single and multiple intake modern concrete headworks, wadi bank protection and bed stabilisation, sediment control and management structures like gravel trap or scour sluices.

### 3. ORGANISATION AND WATER GOVERNANCE

Institutional, legislative, and socio-economic attributes of spate flow management at basin, system and at field level. Water rights - changes in water rights system - codification, social organisation, efforts to improve local organisation and ensure adequate operation and maintenance in traditional and improved settings. Link between spate irrigation and other water management functions, in particular protection from village flooding and provision of water supply.

### 4. SOIL AND WATER CONSERVATION AND MANAGEMENT

Field-to-field and individual-field water distribution systems and field water spreading structures. Measures for enhancing groundwater recharge from flat sections of spate flows, water ponded at bunds and weirs and from river beds. The effects of traditional and modern tillage and mulching practices, design and maintenance of field bunds and inlets, irrigation scheduling, spate flow concentration or spreading on soil moisture storage. The conceptual background and practical application of Soil Water Accounting model (SWAM) in soil moisture simulation. Salinity and sodicity, and land fertility degradation impacts on crop yield and soil infiltration rates.

### 5. SPATE IRRIGATION AGRONOMY

Focuses on spate irrigated cereals and horticultural crops: water functions in plants, nature and type of root development, transpiration requirements, germination rate and uniformity, vulnerability to pest and diseases, water yield curves and crop production functions under water stress. Impacts of different agronomic practices on crop yield: mulching; fertilisation; intercropping food and horticultural crops with multipurpose trees; alternate cropping of leguminous and non-leguminous crops; type, depth and frequency of tillage; pest, disease and weed control; harvest and post harvest technologies. Analysing irrigation water requirement and scheduling using CROPWAT model.

### 6. GROUP ASSIGNMENTS AND FIELD TRIPS

Participants analyse the technical, institutional, social-economic and environmental strengths and weaknesses of two spate irrigation projects where modernisation and water management improvement activities have been carried out. A field trip to historical flood water management structures and sites.

UNESCO-IHE believes that partnerships and networks are of vital and strategic importance in improving access to, sharing and disseminating information. UNESCO-IHE acts as an interface between knowledge centres, as well as public and private sector organizations, individual scientists and professionals. The Institute aims to contribute to the achievement of synergy in the programmes and activities of existing knowledge networks.

The Institute encourages all persons involved in the water sector to participate in the dynamic network of partnerships.

UNESCO-IHE provides postgraduate education, training and research in the fields of water and the environment for mid-career and senior professionals from developing countries. Since 1957, the Institute's community of partnerships includes public and private organisations.

The UNESCO-IHE community also includes over 13,400 Alumni active in water sectors worldwide, representing an extensive network of international water professionals of yesterday, today and tomorrow.

**WWW.UNESCO-IHE.ORG/SPATE**

## FEE, SCHOLARSHIP AND REGISTRATION

The tuition fee for the course is 1,360 Euros. This does not include (hotel) accommodation; UNESCO-IHE student hostel might be available. Students can obtain a reduction upon request. Fellowship possibilities can be explored at: www.grantfinder.nl. The course can be accredited according to the standard of the European Credit Transfer System.

For further information and registration, please fill in the registration form or contact

- Ms. Claudia Brakel, *Registration Officer* (c.brakel@unesco-ihe.org) T +31 (0)15-2151720, or
- Abraham Mehari Haile, PhD, MSc, *Coordinator* (a.meharihaile@unesco-ihe.org) T +31 (0)15 2151824.
- See www.unesco-ihe.org/spate

## PARTICIPANT PROFILE

Participants are invited from government and non-government institutions or universities with background in irrigation and drainage, agricultural engineering, civil engineering, water resources management, and other water related fields. Computer literacy is highly preferred.

## PARTNERS

Spate Irrigation Network www.spate-irrigation.org

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UNESCO-IHE Institute for Water Education

# APPLICATION FORM SHORT COURSE

UNESCO-IHE, PO BOX 3015, 2601 DA DELFT, THE NETHERLANDS

1 **Short Course on** _____

**Date** _____

2 **Full name** _____ male / female

Official name (as mentioned in your passport) _____

Date, place and country of birth _____

Present citizenship _____

**Postal address** _____

Phone _____ Fax _____ E-mail _____

Profession _____

3 **College and / or university education**

Name and place _____

From _____ to _____ Degree _____

Main studies _____

Thesis or major _____

Name and place _____

From _____ to _____ Degree _____

Main studies _____

Thesis or major _____

Professional publications (use additional sheet if necessary) _____

4 **English language proficiency** (fair F, good G, excellent E) - circle as appropriate

read F G E write F G E speak F G E understand F G E

Was English the language of instruction in secondary school / university? yes / no

If not, please attach the result of your English language test (TOEFL/IELTS)

5 **Present professional employment** (use additional sheet if necessary)

Job title _____ from _____

Employer, name _____

Postal address _____

Phone _____ Fax _____ E-mail _____

Responsibilities _____

Categories: government / non-government / private / semi-government / parastatal (circle the one applicable)

***In case you are involved in the execution of a specific project:***

Project name _____

Location _____

Executing agency _____

Financing provided by _____

6 **Short description of previous posts during the last 7 years**

**From** **to** **Job title**

Duties

Employer, name

Phone E-mail

**From** **to** **Job title**

Duties

Employer, name

Phone E-mail

**From** **to** **Job title**

Duties

Employer, name

Phone E-mail

7 **Personal statement of why you wish to participate in this course (approximately 100 words)**

8 **How were you informed of this course?**

9 **How do you intend to pay for the costs of your stay and other expenses (fees, etc.) in the Netherlands?**

10 **Have you received confirmation of financial support from your sponsor? yes / no**

Date Signature applicant

11 **This application is supported by my employer / supervisor / head of department who will:**

☐ cover the cost of participation in this course

☐ assist me in looking for funds to cover the cost of participation

Name Signature employer / supervisor / head of department