18th World Congress of Soil Science
July 9-15, 2006 - Philadelphia, Pennsylvania, USA

Friday, 14 July 2006 - 4:00 PM
112-2

Water and Soil Salinity Management and Sslt Redistribution in Irrigation Systems.

Bernard Vincent[1], Serge Marlet[2], Alain Vidal[1], Sami Bouarfa[3], Jingwei Wu[4], Jingzong Yang[4], Mamadou K. N'Diaye[5], Marcel Kuper[2], and Daniel Zimmer[6]. (1) Cemagref, Parc de Tourvoie, Antony, 92164, France, (2) CIRAD, Centre Avalette, Ave Agropolis, Montpellier, 34000, France, (3) Cemagre, rue Jean François Breton, Montpellier, 34000, France, (4) Wuhan Univ, Drainage Dept, Wuhan, China, (5) IER, Bamako, Mali, (6) World Water Council, Espace Gaymard 2 Quater pl Arvieux, Marseille, 13002, France

Soil salinity is present in most of the large irrigation schemes over the world under the conjunctive effect of low quality irrigation water, aridity and lack of natural drainage ofsoils and aquifers. The trends in water management and soil salinity are assessed through studies in China, Mali, Pakistan and Uzbekistan. In China, the upper valley of the yellow river (Huinong irrigation district) is characterized by aridity, good water availability and over-irrigation. Despite large amount of drainage water returned to the river, excess in water supplied a shallow water table, accumulated in depression and resulted in soil salinity. Remote sensing showed that downstream areas are more affected by salinity and displayed lower cropping intensity. The lower valley (Bojili Irrigation District) is faced with shortage of irrigation water. Drainage water of low quality is re-used to assist leaching and get round salinity hazard.In Mali (Office du Niger), the soils are affected by an alkalinization process due to irrigation water quality. A previous reclamation of irrigation and drainage systems has modified agricultural practices and water management, and altered the trend of soil alkalinity. The improvement of surface drainage of flooded rice cropping season has decreased soil pH in clayey basins. Concomitantly the improvement of irrigation has allowed cropping during the dry season. Nowadays water stands in irrigation canal all year long and supplies a shallow water table. The recharge is high on permeable material and soil pH increases on sandy levees. In Pakistan (Chistian sub-division) shortage of irrigation surface water has lead to a significant increase in conjunctive use of groundwater of low quality. Consequently the water table and soil salinity decreased while soil sodicity increased even if leaching is improved. Whereas farmers got used to control salinity, the sodification hazard is more difficult to grasp and manage. To assess the extension of soil degradation, remote sensing can only provide accurate information through assimilation of additional information. In Uzbekistan (Fargana valley), a deep drainage system has been set up in order to reduce waterlogging and control soil salinity. The discharge of salt by drainage is more than twice the salt amount provided by irrigation due to the mobilization primary aquifer salinity. This operation is technically successful but environmentally dreadful. Too many water is diverted from Syr-Daria and Amou-Daria rivers and Aral Sea declined dramatically. The salinity of downstream plains increased. Salinization is the consequence of various complex processes of salt redistribution which depends on natural conditions, system features, agricultural practices and irrigation and drainage management. These evolutions result from alteration induced by agricultural water management within contexts of limited drainage, increasing conjunctive use of low quality drainage or groundwater, or the release of drainage water downstream. Salinity management requires an appropriate methodology in order to understand the involved process and to assess decisions for management and planning according to the current and expected impact on the system. Spatial distribution of salt can be characterized at specific dates through remote sensing at small scales and soil survey at higher scales. It requires additional information for pertinent analysis of the origin of this distribution. In a first stage, trends can be assessed by the estimation of water and salt balance at various scales within the irrigated area. Later stage consists in the implementation of a perennial complementary device including groundwater and soil monitoring, and also the analysis of agricultural water management for the assessment of both performances and sustainability of irrigation. It allows further development of decision-making tools and accompanying methods for the control of salinity.

Back to 3.5D Combating Global Soil & Land Degradation IV. Salinization, Sodification and Other Forms of Degradation in Agricultural and Native Ecosystems - Oral
Back to WCSS

Back to The 18th World Congress of Soil Science (July 9-15, 2006)