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Challenges to Stakeholder Participation in Water Reuse for Irrigation in Jordan

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Developing new water resources continues to be a challenge in water scarce regions and water reuse offers a sustainable means by which water availability can be maximised. In Jordan, treated domestic wastewater (reclaimed water) already provides a valuable contribution to the annual water budget. This resource is used for irrigation either directly around wastewater treatment plants, or indirectly after reclaimed water released from treatment plants has been transferred though natural waterways and blended with surface runoff. Direct reuse is employed for the irrigation of fodder crops such as barley or alfalfa, while indirect reuse is employed for the irrigation of high-value fruit and vegetable crops grown in the Jordan Valley, a major commercial agricultural area. In order to ensure water reuse is conducted successfully, it is essential that the benefits of reclaimed water (water availability, high nutrient content) are maximised while the potential risks (to human health, soil sustainability and agricultural yields) are minimised. Stakeholder participation in water reuse management decisions could raise the capacity of the water user (such as the farmer) to manage the risks without compromising the benefits of this resource. To investigate the extent to which stakeholders are participating in water reuse management, semi-structured interviews with farmers and institutional representatives were conducted in Jordan. A particular aim of the interviews was to explore the variation in participation between those stakeholders using reclaimed water directly and indirectly.

The data collected during 56 interviews with Jordanian farmers showed that the farmers' perception and management of reclaimed water varied considerably between the indirect and direct users. The direct users had a greater level of satisfaction with the water (55 per cent of those asked described the water as "good water") and recognised that they were able to produce larger yields and raise their incomes through this resource. Direct users also felt that communication with the managers of the wastewater treatment plant was more effective and this enabled them to influence the final quality of the water they received (for example, through requesting a reduction in the chlorine concentration in the wastewater effluent due to the negative effect that chlorine has on crop quality).

The indirect reuse farmers had a lower level of satisfaction with the reclaimed water (69 per cent of those asked described the water quality as bad). The interviews revealed that few farmers felt included in water resource management decisions and felt unable to discuss water quality concerns with government officials responsible for water distribution. The indirect reuse farmers seemed to be more concerned with water quality management at the individual farm level, through the installation of water filters to reduce the organic load of the water rather than through processes of lobbying or participatory involvement in decision-making to raise the quality of the water through top-down measures such as the enforcement of water quality legislation.

The interviews with 29 organisational representatives drew attention to the sensitivity surrounding indirect water reuse which seems to inhibit open discussion of the topic. This is likely to be due to the nature of agriculture at the sites of indirect reuse. Institutional representatives appeared to be concerned with the risk of consumer rejection of produce grown with reclaimed water and the associated negative effects of rejection on agricultural income and employment. A strategy of reduced discussion seemed to be adopted in the attempt to minimise the potential for consumer rejection. The present research proposes that this strategy (adopted with the aim of protecting agriculture) could have the reverse effect though inhibiting the participation of farmers in water reuse planning and management (they are unable to take part in a process in which they are not recognised as being involved). Open discussion of reuse is necessary to accurately identify water quality requirements, drive appropriate legislation and subsequently lead to the enforcement of such legislation. This work shows that a major barrier to participation

in water reuse management is the stakeholders' fear that consumer concerns over the use of "waste" resources in food production will reduce marketability. The extent of consumer concerns, in conjunction with stakeholders' perceptions of these concerns, is therefore an important area to be addressed in future research.