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Productivity of Water in Agriculture: Knowledge, Attitude and Practices of Measuring Productivity of Water in Mkoji Sub Catchment (MSC) of the Great Ruaha River Basin in Tanzania



RESEARCH INSTITUTIONS

Knowledge

Researchers conceptualize productivity of water in agriculture as a ratio of all benefits obtained to water depleted in the process of producing them. The benefits vary from direct biomass classified as food grain, fodder and crop residues to implied benefits such as fishing and labour.



Attitudes

Attitude towards productivity of water varies with professional base of a researcher. For example; agronomist conceive productivity of water as yield per evapotranspiration, Irrigation engineer as yield per irrigation supply, policy researcher as net value of produce per evapotranspiration and water resources planner as net value per water extracted.



Practice:

Common data recorded by researchers are irrigation flow diverted for crop production, weather data, evaporation pan data, soil hydrologic properties and crop water requirement to determine the denominator of productivity of water. Sample yield or biomass data is also recorded by researchers as numerator of the equation of productivity of water.



Mekelle



HYDROMETRIC INSTITUTIONS

Knowledge

Forecasting of availability of water to match agricultural production activities (i.e. land preparation, planting and harvesting calendars).

Attitude

Good climatic data and river flow forecasting results to reasonable planning of use of available water, which enables good yields and ensures food security for the greater population.

Practice:

Keeping data of amounts of river flows, ground water and weather data. They also make seasonal forecasting for aiding farmers in planning agricultural production operations



WATER PLANNERS AND ALLOCATORS

Knowledge

The water planners take Productivity of Water in Agriculture as benefits in terms of Land area and crops to be irrigated per water allocated. This is derived from the major type of data required when applying for water right.

Attitude

The approach of planners and water allocating institutions is to ensure that they provide sufficient water to meet clients' demand. They allocate water based on rate of flow per unit time considering equity supply of water for other uses and users of the common source of water. Improved intakes with gates and stage recorders are the most convenient for monitoring water flows as per water right.

Practice:



The irrigation water allocated to clients is mainly based on the designed farm area and crop water demand. There is little consideration of the agricultural yields and outputs. The river basin office has no influence over irrigation productivity of water in agriculture. The only data measured is flow of diverted water while enforcing legal institutions, ensuring legal abstraction of water, provide water rights and collect water user fees. However; very seldom do the water basin office ascertain whether the clients abstract the correct volume of water and they bother not to collect data on benefits accruing from use of the water allocated. Productivity indicator by River basin Water Office is value of water user fee per volume of water allocated and used by the client.



WATER AND IRRIGATION MANAGERS

Knowledge

The primary motive of the Water Users Associations (WUA) and irrigation managers is to ensure equity of water supply to all members of the association. The secondary concern is to ensure that individual users get adequate yields to enable them pay for water user fees and maintenance cost of the irrigation canals. Therefore for WUA's water is productive enough if it satisfies farmers' water demands equitably and ensures high crop yields.

The concern of managers of irrigation schemes is to supply water to meet crop water demand. The secondary concern is to ensure there is high productivity of land in agriculture.

Attitude

WUA ensures equity of water to all members of the association while irrigation managers ensures that they meet crop water demand rather than productivity of water in agriculture.



Practice

Although water is allocated to WUA in terms of volume, which in turn it allocates to farmers in terms of hours of access to irrigation water and according to irrigation schedules decided by WUA. As such they cannot measure productivity in terms of benefits per water used, but in terms of the yield produced, which is the traditional gauging of produce per unit area.



Consideration in measuring water in irrigation systems differs with cost of abstracting water. In gravity irrigation systems such as Kapunga and Mbarali (in which cost of abstracting water is negligible) keeping intake flow data is optional. As for pumped irrigation systems such as Kibena tea estate in Njombe, (in which cost of pumping water is considerable) each drop of water going to the crops is measured. However in both cases it is the cost of water and not the amount of water that is taken in economic analysis of the farms. Mbarali rice farm is more keen (than Kapunga rice farm) in keeping track of intake water because it is the same water that is used for generating electricity power for the farm.

FARMERS IN RAINFED AGRICULTURE

Knowledge:

Smallholder farmers measure amount of water by the frequency and intensity of rainfall in the season. Rainfall is described as less or sufficient rainfall in wet season. Less rainfall results to low crop yield because most crop will suffer drought. However, too much rainfall is not



suitable because crops will not get the necessary temperature for growth. Rainfall that takes three to four weeks without cessation will produce good crop yield. Farmers estimate that good rainfall would produce 10 – 14 bags of maize per acre. However, too much rainfall affects leguminous crops and in most cases produces stunted crops, because most nutrients get leached.



Attitude

Farmers conceive that productivity of rainwater is related to frequency, intensities and duration of rainfall. These aspects have influence to yield of crops.

Practice

Farmers measure the crop produce by weight, tins, plastic, bags, crates and. Water is measured in terms of frequency, intensity and duration of rainfall for the season. Productivity of water is indicated as 'good yield in a good year' or 'bad yield in

a bad year'. Good year means high amount of total rainfall with no intense dry spells in sensitive growing stages of the crop and vice versa.



FARMERS IN IRRIGATED AGRICULTURE

Knowledge

Farmers consider that water is much more scarce and competitive during the dry season. It therefore needs to be used more carefully to produce more valuable crops than in rainfed season. Therefore, Green maize, Tomatoes, beans and short duration vegetables, which fetches high price are normally grown during the dry season

Attitude

Farmers tend to select crops which use less water and gives high returns with low frequencies of irrigation



Practice:

The modes of measuring water in irrigation systems vary with type of irrigation. If the source of water is gravity furrows; farmers do not measure amount of water, because water is allocated in terms of hours and frequency of irrigation. In locations where water is very scarce and where high values crops are grown, farmers use buckets and jerry cans to irrigate. Because of the high labour drudgery involved in fetching water, the count of number of buckets used for producing crops is recorded. However, neither the amount of water no the cost of fetching water is included in the farmers' economic analysis.