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Prioritization of training needs and constraints faced by watershed field functionaries and farmers

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ABSTRACT

Resource conservation programmes are implemented mostly on watershed basis where people's participation is an inbuilt institutional mechanism for ensuring the sustenance and success. Capacity building is pre-requisite for active involvement of villagers based on their prioritized needs. ICAR-Indian Institute of Soil and Water Conservation, Dehradun is working as a nodal agency for organizing training programmes for field functionaries involved in watershed development and management. Present study is an effort to identify, assess and prioritize training needs of the Watershed Development Team (WDT) members and farmers along with office bearers of the watershed committees. In total, 118 farmer respondents of high and mid hills, 36 from lower hills and plains and 35 WDT members were taken for the study. Responses were recorded on five point continuum in form of ranks, viz I, II, III, IV and V. Frequency for each rank was obtained through matrix analysis. Rank Based Quotient (RBQ) for each rank of individual need (sub component) was calculated separately and was summed up to get the final RBQ score. Likewise, it was done for all the sub components of watershed and overall priority ranking was computed on the basis of final RBQ scores. Though, almost all the respondents were from the watershed areas and most of them were office bearers of the WDT committees but their perception in terms of training needs was reflected inclined to personal gains, not towards common cause or community based activities. Equity and transparency were the high priority training needs in case of farmers but for WDT members, these were the least prioritized needs.

Key words: Rank Based Quotient, Training needs and prioritization, Watershed field functionaries, Watershed components

Identification and prioritization of training needs is one of the most important pre-requisite aspects for organizing any effective training programme (Sharma *et al*. 2010). Assessment of training needs is the first and fundamental condition for success of the training programmes as reported by Lynton and Pareek (1990). Developing human resource in the field of soil and water conservation and watershed management is the one of the important requirement for natural resource management. Training needs for different development functionaries can be defined in terms of gap between acquired and required knowledge, skill and attitude for better performance in the field situations (Mishra 1990). Development functionaries showing 'lack of community participation', 'rentier dole syndrome', 'tokenism' and 'paternalistic manipulation' were on higher side which reflected that they do not value more to the people's participation in the development activities (Singh *et al*. 2005). In this context, there is considerable gap in performance of WDT members, field staff and the farmers. This gap can be bridged by increasing knowledge and skill development through organization of well designed training programmes related to their identified and prioritized needs of the WDT members, field staff and the farmers. It will help the functionaries and farmers to implement the watershed development programmes. Similarly, Singh *et al*. (2004) also reported that psychological orientation of the development functionaries including nature of job, perceived influence and supervisory behaviour played important role and relatively higher motivating-empowering style of leadership indicated a tend to motivate and enable their subordinates during working in the field level situations. It has become an essential component in order to keep a competitive edge in the changing scenario of integrated development that ensures sustainability on social, economic and environmental fronts. Resource conservation programmes are successfully executed on watershed basis if villagers/stakeholders are involved from planning to post withdrawal mechanism creation for sustenance. Therefore, it is imperative to focus on developing competency of the farmers as well as field functionaries based on ground reality. ICAR-IISWC, Dehradun is working as a nodal agency for organizing

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training programmes for field functionaries involved in watershed development and management. Present study is an effort to identify and prioritize training needs of the Watershed Development Team (WDT) members and farmers specially office bearers of the watershed committees.

MATERIALS AND METHODS

Respondents (farmers and WDT members) attended short training courses organized at ICAR-IISWC, Dehradun during 2008-13 were interviewed for data collection. Farmers and WDT members from the watersheds in district Dehradun, Haridwar and Udham Singh Nagar were kept under the category of lower hills and plains, whereas farmers and WDT members from watersheds in remaining 10 districts (Uttarkashi, Chamoli, Tehri-Garhwal, Pauri-Garhwal, Champawat, Nainital, Almora, Pithoragarh, Bageshwar and Rudraprayag) of Uttarakhand were included under the category of high and mid hills. So, total 154 farmer respondents involving high and mid hills (118), lower hills and plains (36) and WDT members (35) were interviewed from the state of Uttarakhand. Data were collected through using interview schedule containing all the components of watershed management, viz soil and agronomical, mechanical, horticulture, forestry measures, institutional and capacity building and income generating activities. List of sub components was prepared after extensive review, focused discussion with experts and farmers. Responses were recorded on five point continuum in form of ranks, viz I, II, III, IV and V. Frequency for each rank was obtained through matrix analysis. Rank Based Quotient (RBQ) (Sabarathnam 1988) for each rank of individual need (sub component) was calculated separately and was summed up to get the final RBQ score. Likewise, it was done for all the sub components of watershed and overall priority ranking was computed on the basis of final RBQ scores.

$$RBQ = \frac{Fi\ (n + 1 - i)}{N \times n} \times 100$$

where, Fi = Frequency of farmers/WDT members for i^{th} rank of problem, n = No. of ranks (Total number of sub components), N = No. of farmers/WDT members.

RESULTS AND DISCUSSION

Soil and agronomical measures

In high and mid hills of Uttarakhand, where average land holding is less than one ha and is mostly rainfed, if farmers wish to go for improved crop varieties and with that different crop diversification options, doses and methods for use of chemical fertilizers and plant protection chemicals become crucial. To get higher crop productivity, farmers apply higher doses of chemical fertilizers and agricultural chemicals which lead to deterioration in soil health, so, management of soil health is prime concern for sustainable agriculture. Table 1 revealed that doses and use of plant protection chemicals (RBQ-80.14) was ranked first in high hills as prioritized training need followed by cultivation of commercial crops (RBQ-78.29) and awareness about improved varieties of food grain crops (RBQ-76.75). Commercial commodities like fruits, vegetables, flowers and high value field crops require better post harvest management/storage/marketing for higher returns per unit area (RBQ-76.56) and organic food items fetch more profit, so, use of compost (RBQ-74.89) were identified as other high priority training needs by the farmers in high and mid hills (Table 1).

Table 1 Soil and agronomical measures

Training needs	RBQ			Priority ranking		
	High and mid hill farmers (n=118)	Lower hill and plains farmers (n=36)	WDT members (n=35)	High and mid hill farmers (n=118)	Lower hill and plains farmers (n=36)	WDT members (n=35)
Contour cultivation	62.52	54.66	47.41	X	IX	IX
Intercropping/mixed cropping/crop rotations	61.33	53.31	34.84	XI	XI	XI
Doses and use of chemical fertilizers	63.7	53.32	37.13	IX	X	X
Improved crop varieties	76.75	84.98	66.84	III	I	VII
Doses and use of plant protection chemicals	80.14	74.98	83.41	I	III	I
Compost/Vermicompost preparation	74.89	67.2	71.41	V	VI	III
Green manuring	58.79	68.87	70.26	XII	V	IV
Mulching materials and techniques	70.48	59.43	79.99	VIII	VIII	II
Nursery raising	72.52	65.53	68.56	VI	VII	VI
Commercial crop cultivation (Off-season Vegetables/ Pulses/ Oilseeds/ Medicinal plants/ Spices)	78.29	83.31	69.7	II	II	V
Seed production	71.31	65.53	65.69	VII	VII	VIII
Post harvest management/storage/ marketing	76.56	73.31	47.41	IV	IV	IX

In lower hills and plains, weather conditions varied as compared to high and mid hills as well as land holding is also bigger, hence, awareness about improved crop varieties was reported as top priority (RBQ-84.98) training need followed by commercial crop cultivation (RBQ-83.31). Use of higher doses of chemical fertilizers and plant protection chemicals (RBQ-74.98) followed by green manuring (RBQ-68.87) were identified as other high priority areas of trainings (Table 1).

Training needs prioritized for the WDT members were somewhat different from farmers. Use of chemical fertilizers and plant protection chemicals (RBQ-83.41), application of mulching materials (RBQ-79.99), preparation of compost/ vermi-compost (RBQ-71.41), green manuring (RBQ-70.26) and cultivation of commercial crops (RBQ-69.7), etc. were the major areas for their capacity building related to soil and agronomical measures of the watershed (Table 1). Areas of training for WDT members are depend on their past experiences, expertise developed, requirements of the resource conservation programmes and demand of the different stakeholders.

Horticulture and agro-forestry measures

Horticulture and agro-forestry measures in watershed showed that plant protection measures in vegetables and fruits (RBQ-81.84) reported as top prioritized training need followed by pruning/budding/layering techniques (RBQ-79.13), agroforestry tree species and techniques for arable lands (RBQ-75.57) in high and mid hills (Table 2). Orchard establishment (RBQ-75.25) and fodder production/pasture development (RBQ-72.0) were other training areas felt by the farmers in high and mid hills. While in lower hills and plains (Table 2), agro-forestry tree species and techniques for arable lands (RBQ-81.1) was ranked first followed by orchard establishment (RBQ-75.53) and pruning/budding/layering techniques (RBQ-69.42). Plant protection measures in vegetables and fruits (RBQ-67.76), fodder production/pasture development (RBQ-62.75) and vegetative barriers (RBQ-65.53) were identified as other high priority training needs. Fodder production/pasture development was common in both the stratified groups of farmers but priority in training was reflected as low i.e. V^{th} and VI^{th} in high and mid hills and lower hills and plains, respectively. The resulted pattern in high and mid hills may be due to small size land holding and farmers were getting large quantity of fodder from the forest area. In lower hills and plains, where sizes of holdings are comparatively bigger, are collecting fodder from their agricultural fields and forest. WDT members (Table 2), as their major concern is to reduce the pressure on forest for fodder and fuel wood, have indicated agro-forestry tree species and techniques for arable land (RBQ-86.84) and fodder production/pasture development (RBQ-83.98) as their top priority training needs.

Mechanical measures

Farmers reported their prioritized training areas and ranked first was terracing (RBQ-75.9) followed by retaining wall (RBQ-73.03) and bunding and leveling (RBQ-67.76) in high and mid hills (Table 3). Drip/sprinkler irrigation (RBQ-67.59), water harvesting and recycling (RBQ-67.43) were areas of capacity building of the farmers. They realized the importance of saving water and conserving soil for enhancing their crop productivity and profitability. Farmers in lower hills and plains (Table 3) also have expressed their concern over land development and irrigation water and have ranked first to bunding and leveling (RBQ-74.97) followed by terracing (RBQ-69.43) and water harvesting and recycling (RBQ-66.63). Ground water recharge (RBQ-63.87) and drip and sprinkler irrigation (RBQ-63.87) were the other priority training needs. In case of WDT members (Table 3), priority training needs identified were water harvesting and recycling (RBQ-83.98), drip/sprinkler irrigation (RBQ-78.27), ground water recharge (RBQ-78.26), designing and costing of SWC structures (RBQ-77.69) and drop structures (RBQ-69.12). Training needs expressed by the farmers or by the WDT members in the mechanical measures are the indication of water scarcity problem existing and their trainings needs areas reflected to get trained in these respective aspects for increasing their income level.

Table 2 Horticulture and agroforestry measures

Training needs	RBQ			Priority ranking		
	High and mid hill farmers (n=118)	Lower hill and plains farmers (n=36)	WDT members (n=35)	High and mid hill farmers (n=118)	Lower hill and plains farmers (n=36)	WDT members (n=35)
Vegetative barriers	70.65	65.53	68.55	VI	V	V
Agroforestry tree spp. and techniques for arable lands	75.57	81.1	86.84	III	I	I
Agroforestry tree spp. and techniques for non-arable land	50.82	57.2	70.84	VII	VII	IV
Orchard establishment	75.25	75.53	52.55	IV	II	VII
Pruning/budding/layering techniques	79.13	69.42	66.26	II	III	VI
Plant protection measures in fruit trees	81.84	67.76	76.55	I	IV	III
Fodder production/pastures development	72.0	62.75	83.98	V	VI	II

Table 3 Mechanical measures

Training needs	RBQ			Priority ranking		
	High and mid hill farmers (n=118)	Lower hill and plains farmers (n=36)	WDT members (n=35)	High and mid hill farmers (n=118)	Lower hill and plains farmers (n=36)	WDT members (n=35)
Water harvesting and recycling	67.43	66.63	83.98	V	III	I
Ground water recharge	62.54	63.87	78.26	VII	IV	III
Drip/Sprinkler irrigation	67.59	62.76	78.27	IV	V	II
Check dams	59.3	46.66	68.54	X	X	VI
Bunding and levelling	67.76	74.97	43.42	III	I	XII
Terracing	75.9	69.43	42.83	I	II	XIII
Gabion structures	23.71	38.88	55.98	XIII	XII	IX
Trenching	28.45	47.2	51.97	XI	IX	X
Retaining wall	73.03	55.54	43.41	II	VII	XIV
Roof water harvesting	61.32	59.43	59.4	VIII	VI	VII
Landslide control	63.2	46.09	50.83	VI	XI	XI
Stream training	59.97	49.42	58.84	IX	VIII	VIII
Drop structures	24.4	33.33	69.12	XII	XIII	V
Designing and costing of SWC structures			77.69			IV

Institutional development and capacity building

Capacity building was one of the important demand by the farmers to develop their knowledge, skill and attitude towards soil and water conservation and other developmental aspects irrespective of their varied areas (Table 4). Farmers expressed that equity and transparency are important indicators for effective working of social organization. In case of WDT members also capacity building (RBQ-86.27) was found to be the top priority training need but it was interesting to note that equity and transparency (RBQ-65.13) was found to be the least priority training need (Table 4). Indirectly it explains the "System Blame" hypothesis by A W Van den Ban and H S Hawkins (1999).

Other income generating activities

In rainfed conditions, mixed farming is common practice which promotes sustainable agriculture among small and marginal holders. Therefore, in high and mid hills, livestock care and management (RBQ-79.46) was identified as top priority training need followed by fruit preservation (RBQ-76.27) and poultry farming (RBQ-75.07) (Table 5). Goat/sheep/pig rearing (RBQ-73.36) was identified as fourth rank training need because farmers perceived that it is our traditional wisdom and not required any expertise to rear them. These enterprises help the farmers to get the income at regular interval to fulfill their daily needs. In lower hills and plains (Table 5) also livestock care and management (RBQ-82.2) was identified as second priority training area followed by fruit preservation (RBQ-68.86), goat/sheep/pig rearing (RBQ-68.86) and fish production (RBQ-59.98). Poultry rearing (RBQ-89.98) was shown a major need to develop their competency for fetching higher return. It may be due to ensured marketing network with higher economic return. In case of WDT members, fruit preservation (RBQ-82.27) was ranked top priority need followed by livestock care and management (RBQ-75.42) and fish production (RBQ-63.98) while mushroom cultivation (RBQ-55.98), goat/sheep/pig rearing (RBQ-55.8) and poultry farming (RBQ-51.41) were identified as low priority training needs, respectively (Table 5).

Table 4 Institutional development and capacity building

Training needs	RBQ			Priority ranking		
	High and mid hill farmers (n=118)	Lower hill and plains farmers (n=36)	WDT members (n=35)	High and mid hill farmers (n=118)	Lower hill and plains farmers (n=36)	WDT members (n=35)
Community organization and mobilization	77.95	71.56	81.69	II	III	II
Capacity building	79.46	88.32	86.27	I	I	I
Management of common property resources	71.69	68.87	73.12	IV	IV	III
Equity and transparency	78.45	78.88	65.13	II	II	IV

Table 5 Other income generating activities

Training needs	RBQ			Priority ranking		
	High and mid hill farmers (n=118)	Lower hill and plains farmers (n=36)	WDT members (n=35)	High and mid hill farmers (n=118)	Lower hill and plains farmers (n=36)	WDT members (n=35)
Livestock care and management	79.46	82.2	75.42	I	II	II
Fish production	62.34	59.98	63.98	VI	IV	III
goat/sheep/pig/silkworm rearing	73.36	68.86	55.4	IV	III	V
Mushroom cultivation	70.82	45.55	55.98	V	V	IV
Fruit preservation (Pickle, jam, jelly, papad etc.)	76.27	68.86	82.27	II	III	I
Poultry production	75.07	89.98	51.41	III	I	VI

Constraints

Farmers ranked time limitation (RBQ-77.65) to attend any on campus training was reported top priority constraint (Table 6). Farmers showed their less interest in attending any interaction, meetings with experts, exposure visits, trainings, etc. while their active involvement in watershed development activities needs from planning to evaluation stage. Sustenance of any watershed project is possible only through people's participation and realizing the ownership of group activities. Training not imparted to the farmers is not well acquainted with project objectives and basic philosophy of the programme. So, they create hindrance during the implementation of watershed development programmes. Hence, it was recorded as 2nd (RBQ-74.13) priority constraint.

There was mismatch between farmers need and content of the trainings, hence, their actual needs was not fulfilled as expressed 3rd rank (RBQ-71.27) constraint by the farmers. Other constraints were lack of knowledge about terms and conditions of the people's participation (RBQ-68.94), lack of knowledge about project objectives (RBQ-66.34), insufficient follow-up visits by the staff members (RBQ-64.39), more emphasis on "Know how", less on "Do how" (RBQ-64.0) and lack of co-operation from educated families in the activities of common concerns (RBQ-61.66) (Table 6).

Table 6 Constraints perceived by the farmers (n=154)

Training needs	RBQ	Priority ranking
Lack of project objectives orientation	66.34	V
Unaware about participatory process	68.94	IV
No regular follow ups visits of the staff members	64.39	VI
Lack of emphasis on do how or learning by doing in the trainings	64.0	VII
Lack of need based trainings	71.27	III
Lack of proper identification of the trainees	61.66	VIII
No sufficient time for on campus trainings	77.65	I
Trainings to few farmers	74.13	II

In case of WDT members, more awareness of farmers on resource conservation projects through participatory process create troubles in implementation (RBQ-82.84) was ranked first constraint followed by lack of component on farm machinery and integrated pest management (RBQ-81.12), poor participation of farmers who are really involved in farming operation (RBQ-75.98), respectively (Table 7). In the different training programmes organized, lack of experts on other income generating activities (RBQ-71.4), less emphasis on "do how" (RBQ-62.84) and insufficient coverage on marketing strategy at grass root level (RBQ-53.12) were identified as the other important constraints perceived by the WDT members.

Study indicates priority training needs in soil and agronomical measures, viz use and doses of plant protection chemicals, preparation of vermi-compost and commercial crop cultivation were the proof of their inclination towards the progress and development. In case of mechanical measures, results showed that farmers wish to conserve soil and water by means of terracing, retaining walls, bunding and leveling etc. In horticultural and agro-forestry measures, priority needs like plant protection followed by budding/pruning/layering, establishments of orchards and tree species for arable lands, indicated their concern towards enhancing productivity and profitability.

In other income generating activities, livestock care and management, poultry production and goat/sheep/pig

Table 7 Constraints perceived by the WDT members (n=35)

Training needs	RBQ	Priority ranking
More orientation on participatory process perceived as hurdle in programme implementation	82.84	I
Lack of concern experts on different subjects	81.12	II
Lack of experts on income generating enterprises	71.4	IV
More focus on skill oriented training	62.84	V
Off-campus trainings	75.98	III
Lack of information on marketing strategy	53.12	VI

rearing were identified as the top priority training needs. It showed that these are the enterprises which could sustain comfortably with the crop cultivation, thus holds the status of high priority training needs for further improvements, irrespective of hills or plains. In institutional development and capacity building, capacity building and equity and transparency were found to be the high priority training needs. Further study indicates that farmers are more concerned about their personal gains not for common cause or group based activities. It shows negative attitude of the farmers towards their involvement in watershed activities. It can be improved by organizing well designed trainings to the farmers.

In case of WDT members most of the training needs were of common concern, viz water harvesting and recycling ground water recharge, fodder production and pasture development. Though almost all the respondents were from the watershed areas and most of them were office bearers of the committees and groups but their thinking was still individualistic. It also indicates the lack of intensive rapport building and awareness in the watershed management programmes they belonged to. It was interesting to note that equity and transparency was the high priority training need in case of farmers but it was least priority need in case of WDT members. It is also not a positive sign for the participatory watershed development programmes. Factors like age, service length, job performance and training exposure could be considered significantly while conducting any training programmes and training needs of extension agents changed over time; hence, training needs assessment should be done on a regular basis (Nongtdu *et al*. 2012).

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