



**UNIVERSITI PUTRA MALAYSIA**

**AN ASSESSMENT OF PARTICIPATORY INTEGRATED WATERSHED MANAGEMENT  
IN THE HILKOT WATERSHED, MANSEHRA, PAKISTAN**

**HAKIM SHAH**

**FH 2008 3**



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MANAGEMENT IN THE HILKOT WATERSHED, MANSEHRA, PAKISTAN**

By  
**HAKIM SHAH**

**Thesis Submitted to the School of Graduate Studies, Universiti Putra  
Malaysia, in Fulfilment of the Requirements for the Degree of Master of  
Science**

**16<sup>th</sup> October 2008**



Abstract of thesis presented to the Senate of Universiti Putra Malaysia in  
fulfilment of the requirement for the degree of Master of Science

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**October 2008**

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The 1600 ha Mountainous Hilkot Watershed, located in the Mansehra District, Pakistan had to support a population of 9500 people for their livelihood. Situated in moist temperate zone, the community is mostly dependent on agriculture, forestry, livestock and remittances for their livelihood. Due to ever increasing population, overgrazing, illicit cutting of forests for timber and fuel wood, lack of fuel wood alternatives, unawareness and extreme poverty, the natural resources are under tremendous pressure. A number of projects have been executed in the past in Hilkot watershed related to watershed management and natural resource management. The site was selected for the study due to the participatory watershed management program implemented in the area.

This study was conducted to assess the impacts of participatory integrated watershed management in sustainable management and development of degraded natural resources of Hilkot watershed particularly with respect to

People and Resource Dynamic Project (PARDYP) specifically on the contribution in the livelihood improvement and socio-economic development of the communities of the watershed. A cluster random sampling technique was used for the selection of sample size with sampling intensity of 20 percent. Out of 938 households, 188 (20%) were randomly selected and interviewed using a structured questionnaire while secondary information were collected from the local and national agencies.

The assessment of the study indicates that the participatory integrated watershed management program in Hilkot watershed brought social, economic, institutional improvements and watershed development which led to increase in productivity and livelihood of people. The major social improvements were positive changes in the peoples' attitudes and awareness, high community participation, capacity building and skill enhancement of households, improvement in women role and linkages among stakeholders and coordination among governmental and non – governmental agencies. The linkages and mutual cooperation among the stockholders, supported activities well which often resulted in more interaction among them as reported by 83% respondents. Although inhabited by different ethnic groups with divergent interests and political affiliation, conflicts were mostly resolved through mediation (67%), consultation (50%) and compensation (27%). In terms of mediation, the elder Jirga system was found to be the most influential way for resolution of disputes (83.5%).

The study suggests that there was highest participation of male (87%) and female (70%) in the watershed activities. About 78% of the respondents participated in planning, 73% in monitoring and 56% in evaluation. There was also good participation in other activities viz. individual and monthly meetings (83%), trainings (65%), farmers' days (67%) and income generating training (49%). Among the residents, the majority felt that there was increase in gender participation (69%), increase in decision making role (55%), increase in empowerment (47%), improvement in socio-economic level (56%) and improvement in overall condition of women (58.5%). There was high application of the techniques such as land preparation (51%), nursery raising (63%), cutting & budding (51%) as well as income generating trainings like food technology (31%), honeybee (46%), kitchen gardening (53%), sewing and embroidery (60%), which led to better productivity.

The economic improvements brought by the watershed program, as stated by villagers include increase in agricultural and forestry activities, crop yields, employment opportunities and increase in household's income, The overall natural management activities improved. A large number of the respondents reported increase in crop production (93%), number of trees planted (89%) and vegetable production (70%). The plantations especially of the fast growing tree species helped the locals to overcome their short term timber and fuel-wood requirements. The study suggests that wheat production increased from 1339 to 3275 kg/ha and rice from 1400 to 2950 kg/ha. In addition, with the introduction of the System of Rice Intensification (SRI) technique, the production of rice

increased to 6650 kg/ha and a two fold increase in straw. The watershed activities were good sources of employment for the people of Hilkot particularly for the landless and small farmers. Poor farmers stopped migration to other areas for employment as income of households was increased due to watershed management activities as reported by majority of respondents (61.7%) to RS. 5000 in 2007 compared to RS. 2250 in 2002 due to improved varieties of cereal crops and skilled enhancement activities. Interestingly, majority of the respondents (98%) reported that the watershed program was helpful in raising household income and livelihood improvement.

The watershed management impacts are the rehabilitation of degraded sites, improvements in field techniques, increase in water supply and reduction in soil erosion, the severe problems in Hilkot, which were addressed through adoption of several bio-engineering and vegetative rehabilitative measures reported by 81% respondents with increase in cereal crop production, vegetable and tree cover and improvement in drinking water.

The overall assessment can be concluded that the participatory integrated watershed management program implemented in Hilkot watershed was successful in bringing social, economic, institutional and watershed management improvements in Hilkot watershed and increased the productivity and livelihood of communities. This approach could also be replicated in other watersheds especially in northern-Pakistan where the watershed conditions are similar to Hilkot.

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk ijazah Master Sains

**PENILAIAN TERHADAP PENGLIBATAN PENGURUSAN  
LEMBANGAN BERSEPADU KEPADA PENGURUSAN  
DI LEMBANGAN HIKOT , MANSEHRA , PAKISTAN**

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Lembangan Pergunungan Hilkot, seluas 1600 hektar, yang terletak di daerah Mansehra, Pakistan telah menampung kehidupan penduduknya seramai 9500 populasinya. Terletak di zon iklim sederhana lembap, kebanyakan masyarakatnya bergantung kepada pertanian, perhutanan, penternakan dan pengremitan mata wang sebagai cara hidup. Sejalan dengan pertambahan populasi, lebihan ragutan, pemotongan hutan secara haram untuk balak dan kayu api, kekurangan sumber kayu api alternatif, tiada kesedaran dan kemiskinan tegar telah, mengakibatkan sumber-sumber semulajadi berada pada tekanan sangat hebat. Pelbagai projek telah dirancang pada masa lepas di Lembangan Hilkot yang berhubung kait dengan pengurusan lembangan dan sumber semulajadi. Tapak tersebut telah dipilih dalam kajian ini dalam program penglibatan pengurusan lembangan yang telah dilaksanakan di kawasan ini.

Kajian ini dilakukan untuk menilai kesan penglibatan pengurusan lembangan

bersepadu dalam ketahanan pengurusan dan pembangunan sumber semulajadi yang lupus di Lembangan Hilkot khususnya dari aspek kemanusiaan dan Projek Sumber Dinamik (PARDYP) terutamanya sumbangannya terhadap peningkatan cara hidup dan pembangunan sosio-ekonomi komuniti di lembangan tersebut. Teknik persampelan rawak berkelompok telah digunakan untuk pemilihan saiz sampel dengan kepadatan sampel 20 peratus. Daripada 938 isi rumah, 188 (20%) telah dipilih secara rawak dan ditemu bual melalui soal selidik berstruktur sementara maklumat sekunder telah diperolehi dari agensi-agensi tempatan dan nasional.

Kajian penilaian ini menunjukkan program penglibatan pengurusan lembangan berintegrasi di Lembangan Hilkot membawa kepada pembangunan sosial, ekonomi, peningkatan institusi dan mengarah kepada pertambahan dalam produktiviti dan cara hidup masyarakat. Peningkatan sosial terbesar adalah perubahan positif pada sikap dan kesedaran masyarakat, penglibatan komuniti yang tinggi, pembinaan keupayaan dan peningkatan kemahiran isi rumah, peningkatan peranan wanita dan hubungan kait antara pelabur dan kerjasama antara pihak agensi kerajaan dan bukan kerajaan. Hubungan dan kerjasama secara menang-menang, antara pelabur, yang disokong dengan pelbagai aktiviti, telah menghasilkan interaksi yang meningkat antara mereka seperti yang dilaporkan oleh 83% responden. Walaupun dihalang oleh perbezaan kumpulan etnik dengan minat dan latar belakang politik yang berlainan, konflik-konflik kebanyakannya diselesaikan melalui pengantaraan (67%), permintaan



nasihat (50%) and ganti rugi (27%). Dari segi pengantaraan, sistem Jirga Muda telah dikenalpasti sebagai cara yang paling berpengaruh untuk penyelesaian perbalahan (83.5%)

Kajian ini mencadangkan bahawa penyertaan tertinggi dalam aktiviti lembangan, dari pihak lelaki adalah 87% dan perempuan 70%. Hampir 78% responden yang menyertai adalah perancangan, 73% adalah pengawasan dan 56% adalah penglibatan dalam penilaian. Penyertaan yang baik juga adalah melalui dalam aktiviti-aktiviti secara individu dan perjumpaan bulanan (83%), latihan (65%), hari peladang (67%) dan latihan jana pendapatan (49%). Dikalangan penduduk-penduduk, majoritinya merasakan bahawa terdapat peningkatan dalam penyertaan gender (69%), peningkatan dalam peranan membuat keputusan (55%), peningkatan dalam dalam pemberian kuasa (47%), peningkatan dalam tahap sosial ekonomi (56%) dan peningkatan keseluruhan keadaan wanita (58.5%). Terdapat teknik-teknik pengaplikasian tinggi yang dilaksanakan, seperti penyediaan tanah (51%), kewujudan tapak semaian (63%), pemotongan dan penunasan (51%) seperti latihan jana pendapatan, teknologi makanan (31%), madu lebah (46%), perkebunan (53%), penjahitan dan sulaman (60%) menghasilkan pengeluaran yang lebih baik.

Peningkatan ekonomi yang dihasilkan oleh program lembangan termasuklah pertambahan dalam aktiviti pertanian dan perhutanan, perkebunan tanaman, peluang –peluang pekerjaan dan pertambahan dalam pendapatan isi rumah, yang keseluruhannya menunjukkan bahawa aktiviti pengurusan semulajadi telah

meningkat. Sejumlah besar responden telah melaporkan bahawa terdapat peningkatan dalam pengeluaran hasil tanaman (93%), bilangan pokok yang ditanam (89%) dan pengeluaran sayur-sayuran. Perladangan terutamanya spesies pokok cepat tumbuh telah membantu dalam mengatasi keperluan permintaan jangka masa pendek terhadap balak dan kayu api. Kajian ini mencadangkan bahawa pengeluaran gandum telah meningkat dari 1339 kepada 3275 kg/ha and beras dari 1400 kepada 2950 kg/ha. Tambahan pula, dengan pengenalan teknik Sistem Peningkatan Beras (SRI), pengeluaran beras telah meningkat kepada 6650 kg/ha dan jerami padi bertambah dua kali ganda. Aktiviti-aktiviti lembangan adalah sumber-sumber pekerjaan utama untuk penduduk Hilkot terutamanya bagi mereka yang tidak memiliki tanah dan pekebun-pekebun kecil. Jumlah pekebun-pekebun yang miskin telah berhenti daripada berpindah ke tempat-tempat lain untuk mencari pekerjaan sebagai pendapatan isi rumah, telah meningkat oleh kerana aktiviti-aktiviti pengurusan lembangan sebagaimana telah dilaporkan oleh majoriti responden (61.7%) kepada RS. 5000 dalam tahun 2007 berbanding RS. 2250 dalam tahun 2002 disebabkan peningkatan kepelbagaian tanaman bijirin dan peningkatan aktiviti-aktiviti kemahiran. Yang menarik adalah , majoriti responden (98%) melaporkan bahawa program lembangan sangat membantu dalam menambah pendapatan isi rumah dan peningkatan cara hidup.

Kesan-kesan pengurusan lembangan adalah pemulihan tapak terlupus, peningkatan dalam teknik perladangan, peningkatan dalam bekalan air dan penurunan dalam hakisan tanah. Beberapa masalah di Hilkot, seperti yang

telah dinyatakan telah diselesaikan melalui adaptasi kejuruteraan biologi dan pengukuran tumbuhan seperti yang dilaporkan oleh 81% responden dengan meningkatnya dalam pengeluaran tanaman bijirin, sayuran dan pokok serta peningkatan dalam air minuman.

Keseluruhan penilaian boleh dirumuskan bahawa penyertaan program pengurusan lembangan berintegrasi yang telah dilaksanakan di Lembangan Hilkot adalah sangat berjaya dalam membawa peningkatan dari segi sosial, ekonomi, institusi dan pengurusan lembangan, dan telah meningkatkan produktiviti dan cara hidup komuniti. Pendekatan ini boleh juga diguna pakai di lembangan-lembangan lain terutamanya di utara Pakistan yang mempunyai keadaan yang sama dengan lembangan Hilkot.

## ACKNOWLEDGMENTS

All praises and thanks go to the Supreme Ruler of the Universe for the spiritual and gift bestowed upon me in the performance of my routine.

It is not easy to thank enough in so few words everyone who one way or another have enabled me to successfully complete my M.Sc program. I wish to acknowledge dignities and colleagues with the gratitude and appreciation for their contribution that made this thesis presentable.

With profound regards I express my deep sense of gratitude and grateful acknowledgement to the Supervisory Committee Chairman, Associate Prof. Dr. Lai, Food See, Department of Forest Management, Faculty of Forestry, University Putra Malaysia, for his encouragement and assistance, enthusiastic supervision and valuable ideas in the preparation and completion of this thesis during the entire study and also for the editing of the manuscript despite his hectic and busy schedule.

I express my grateful acknowledgements and sincere thanks to the venerable members of the Supervisory Committee, Assoc. Dr. Shukri Mohamed and Dr. Aep Ruhandi, lecturer, Department of Forest Management University Putra Malaysia, for their guidance, valuable suggestions and kind co-operation for the improvement of the manuscript besides their heavy engagements.

I would like to thank the government of Pakistan for the scholarship. A special mention is dedicated to Dr. Bashir Ahmed Wani, Inspector General of Forests, Government of Pakistan and Raja Mohammed Zareef, Director General, Pakistan Forest Institute for their kind encouragement, guidance, continued support and assistance during the study which enabled me to complete my study satisfactorily. I am also grateful to Dr. Sardar M. Rafique, Dr. Raza ul Haq and Raja Khalid Hussain Ex-Director Generals and Haji Mohammad Khan, Director Forestry Research, Pakistan Forest Institute, Peshawar for their support and guidance during the study.

My special thanks and appreciation goes to my colleagues and friends Mr. Anwar Ali and Ayaz, khan, Assistant Silviculturists, Mr. Rifaq Khan and Khalid Javed for their contribution in data collection in the field and analysis. My sincere thanks and appreciation goes to Mohmmad Saeed for help in analysis and Khalid Javed Field Assistant/computer for typing of the manuscript. I am also grateful to Ms. Zulqarnain and Aurang Zeb, Field Assistants, Mr. Wilayat Khan, President of Hilkot Community and other office bearers of Community Organizations in the watershed for their support and cooperation in data collection in the field despite very cool weather.

My sincere thanks go to the ICIMOD and PARDYP- Pakistan for providing me opportunity to utilize the data and information collected during the project period and their support. I am also thankful to all the staff of PFi for their support in one

way or other way especially Yousaf Khan, Kalbi Ali and other staff of the Institute. I am highly grateful to Mr. Saz, Mohammed, Assistant Forest Economist and his staff for supporting family in my absence.

Last but not least, my deepest appreciation and thanks to my affectionate parents and family for their continuous support, inspiration, encouragement and special prayers during the completion of my study.



I certify that an Examination Committee has met on 30<sup>th</sup> July 2008 to conduct the final examination of Hakim Shah on his Master of Science thesis entitled "An Assessment of Participatory Integrated Watershed Management in the Hilkot Watershed, Mansehra, Pakistan" in accordance with Universiti Pertanian Malaysia (Higher Degree) Act 1980 and Universiti Pertanian Malaysia (Higher Degree) Regulations 1981. The Committee recommends that the student be awarded the degree of Master of Science.

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