Experiences, Lessons and Challenges of Soil and Water Conservation in China

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Abstract: The successful modality, key technical measures, and breakthroughs in modern soil and water conservation in China are illustrated and summarized in this paper. Lessons and constraints in the past soil and water conservation work are pointed out and analyzed too. The challenges of modern soil and water conservation are also given in this paper.
Keywords: soil conservation, experiences, lessons, participatory watershed management, and erosion control measures

1 Successful modality of soil conservation in China

Great efforts have been made into soil and water conservation since start of opening outside world. A lot of experiences have been emerged and summarized from grassroots and extended to nation wide. The following are typical modalities, which have greatly promoted the advancement of soil and water conservation work in China.

- Long-term household contract and leasing management.
  To carry out soil conservation works, farmers can make contract with local government based on the principle "who make contract, who is responsible for management and who is benefited". The contracted land is owned by collectives and used and managed by farmers with a term of 30 to 50 years. The contracted land for conservation can be sale and inherited. Government usually provides contracted farmers free seedlings, materials, fertilizers, free interest bank loans, bonus, favorable agriculture tax etc. to promote farmer's enthusiasm for soil and water conservation.
- Auction of land use right of barren hills, waste valleys, barren lands and desolated floodplains
  The barren lands owned by collectives in countryside can be auctioned for use right according to principles "who buy, who is responsible for conservation, who is benefited". The land use right can be sale and inherited. The term of leasing is within 50 years.
- Farmers input their mandatory labor days with subsidy from government
  During the leisure time in farming in winter and spring, farmers are organized to use their mandatory labor days (10 days each year in Beijing) to do the conservation works concentratedly. Professional contingents are organized in many villages to do the works permanently. Government usually provides seedlings, materials as subsidiary.
- Conservation through stock cooperation system
  Capital, resources, labor and technology can be all converted into stock in order to merge all the economic components of national, collectives and individuals. This is favor of fastening control speed and accumulating funds. For instance, in Caijiadian small watershed of Miyun county of Beijing, the village committee, the county government and farmers have the shares of 41,000, 39,600 and 662 shares, respectively. Each share is 1.2 US dollars. According to forecast, in 2005, each share can get interest 0.5 US dollars (From Duan S.H.).
  By the end of 1998, 4.6 million ha of barren lands were auctioned, in which, 2.9 million ha of barren lands were rehabilitated by leasing organizations and stock companies. The number of buyers from rural, urban households and organizations is shown in Table 1.
- Free grains provided for farmers as relieve
  Farmers are provided free grains as aids to convert slopelands into forestlands. According to the current policy, for each ha of converted agricultural land, the farmers receive an annual

payment of 1,500 kg of grain, this corresponds about 256.5 US dollars. If the site was planted with plantation/timber forest, the payment will last for 8 years, if economic trees are planted, it will be for 5 years only. In addition, the farmer will receive 91.5 US dollars/ha to buy seedlings for afforestation.

- Farmer-led investment for small water conservancy and soil conservation projects
  Farmers are encouraged to construct, manage and own small water conservancy and soil conservation projects, one or several households jointly invest and own for small projects. They can also lease or purchase small water conservancy projects and become reliance on water conservancy projects. Local government provides them the bonus or bank loan interests. For example, in Beijing, farmers get 1.2 US dollars for cubic meter of water ponds or 54.9 US dollars per ha of control area.

Table 1 Buyers of barren lands

Buyers					
Area of barren lands auctioned (4.6 million ha)			Area of rehabilitated through auction (2.9 million ha)		
By Farmers	By Urban inhabitants	By Enterprises	By Farmers	By Urban inhabitants	By Enterprises
1,800,000	102,000	14,000	7×10^5	12,000	13,000

2 Breakthroughs of modern soil conservation work

- In 1980, a Symposium on soil conservation with emphasis on comprehensive management of small watersheds was held in Jixian County, Shanxi Province participated by 13 Province to exchange the experience of integrated management of mountains (hills), waters, farmlands, forests and roads with small watersheds as basic units. Since then, the term of “small watershed” has been the strongest note in the chorus of modern soil conservation.
- In May, 1981, Miao Hunman, a ordinary farmer of Hequ County in Shanxi Province, signed the first contract in China with the then production brigade of the people’s commune to carry out soil conservation works in the Xinyaogou watershed with an area of 16.7 ha in 3 years. He completed 11.7 ha of erosion control project in the first year. In 1983 this pioneering undertaking of household based contract-leasing system started to develop nationwide.
- In 1983, Ministries of Water Resources and Finance jointly invested 3.7 million US dollars annually to carry out soil conservation works in 9 severely eroded areas. In 1988, the State Council approved the plan of listing the upper reaches of the Yangtze River as a key area of erosion control. In 1989, rehabilitation of soil erosion in 4 key severely eroded areas of the Three Gorges Project, the lower reaches of the Jinsha River etc. was started with an annual investment of 6.1 million US dollars by the state. The heavy investments symbol the recognition of the importance of soil and water conservation from central government.
- In 1991, “Law of the People’s Republic of China on Soil and Water Conservation” was deliberated and issued during the 20th session of the Seventh Standing Committee of the National People’s Congress. Subsequently, local government authorities promulgated “Implementation Methods of Soil and Water Conservation”. By 1998, 180 thousands pieces of plans on soil and water conservation has been reviewed and approved. Over 35 thousands of illegal cases in soil and water loss had been checked and treated. 48.8 millions US dollars has been imposed for erosion control and facilities compensation.
- In August, 1992, Luliang Prefecture of Shanxi Province started to auction the right of use of

barren hills, waste valleys, barren hillocks and desolated floodplains. This is another breakthrough following small watershed management with household based contract-leasing system.

3 Successful technical measures for soil and water conservation

- Integrated planning of agriculture, forestry, animal husbandry, fishery, sideline production, infrastructure construction and industry etc is the key to the success of soil and water conservation. Through this planning, the utilization rate of land will be high. The proportion for different land use patterns will be adjusted to meet the demand of local people and environment protection.
- Comprehensive management of mountain, water, forest, farmland and road all control measures of soil and water conservation is planned, the labor power, material and funds required in the control and schedule system and technical and economic index are arranged in combination of the conditions in the watershed. All measures should be combined in optimum way to elaborate the overall benefits as well as of ecological and economical benefits.
- Top priority is given to the planning for comprehensive control of small watershed. The combination of gully erosion control with slope surface control, engineering measures with vegetative measures, integration of arbor, shrubs and grasses, combination of prevention with erosion control; short term, medium term benefit generation with long term one; upper watershed management with lower watershed management should be taken into account in the planning.
- Rehabilitation of slope land. To rehabilitate the slope land is one key aspect of the comprehensive control of soil erosion. Great efforts have been made to transform slope land into terrace fields as functions of erosion control and food security. Other measures of contour farming, furrow planting, rotation of grass with crops, rational close-planting and no tillage are also used.
- Soil and water conservation planting. According to natural conditions and social production and living requirements, the suitable species of trees and grasses are chosen to plant economic, fuel, timber and shelter forests and herbage. Land preparation work will be well made before planting to increase the rates of survival and protect vegetation in the beginning stage.
- Building key erosion control engineering works in the gullies. The water interception ditches are built on gully heads to prevent their advancement against the stream; on the gully beds the check dams and sediment block dams are built to fix the datum point of erosion and to stop and store sediment; in the valley on loess plateau check dams were constructed to block sediment and to form land; levees are built on the two sides of gullies to halt expanding of gully banks.
- Constructing small-scaled water resource engineering systems for storing, drainage and diversion of water. To control runoff on slopes and increase the rate of water use, some small-scaled reservoirs, ponds and channels for irrigation are constructed. As shortage of water in North China water cellars with collection basin and sediment desilting basin are built; to drain surplus water on terraces and economic forestland of the wet areas in South China drainage systems are constructed.
- Controlling blown sand and deserts. There are also works to prevent blown sand and deserts such as barriers to block wind and sand, sand transportation by water, and improving land with warping, etc. One of the control models in river valley and terrains is shown in Figure 1.

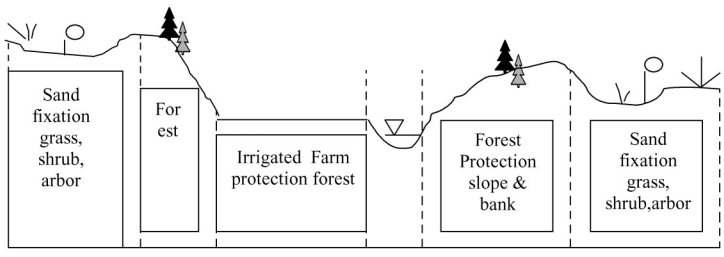

Fig.1 Profile of wind erosion control model in the river valley

4 Lessons and constraints in SWC

The following major lessons have been learned during the past soil and water conservation works:

- Lack of recognition
  Many people are not fully aware of the importance of soil and water conservation and the responsibility and urgent needs to participate in soil and water conservation due to low awareness of seriousness of soil erosion and importance of environment protection.
- The new soil erosion
  The new soil and water loss by irrational human activity is not controlled effectively. According to the result of recent survey by remote sensing, the total soil erosion area is increased. The total water erosion area increased 14,189 km^2. The water erosion area in Tianjin, Gansu, Qinghai, Xinjiang, Sichuan and Tibet increased over 200,000 km^2.
- Large eroded area and relative low investment
  The control tasks are arduous, 60% of the total area with soil and water loss, 2.2 million km^2, are urgently in need to be controlled. To control soil erosion in the loess plateau is very difficult. There are three constraints to soil conservation in this region. First one is large population. For instance, density of population in Yanan, Yulin, Suide, Mizhi and Wupo are 47persons/km^2, 64 persons/km^2,150 persons/km^2,150 persons/km^2, and 160 persons/km^2, respectively. The population carrying capacity in this region is below 30 persons/km^2 according to UN calculation. Second constraint is backward economy and mode of human activity, 90% of total population is directly relying on land, more over on very low yield cultivation enterprise. This has resulted in poverty of local people and reclaiming on steep slopeland. The third one is insufficient investment input for large scale of erosion control project (vegetation and dam systems).
- Low contribution of technology
  The scientific study of soil and water conservation does not coincide with the control works. The powerful service system of science and technology has not been established and the research results are unable to utilize and popularize very effeciently.
- Lack of corresponding framework for participatory WM
  The participatory WM is being recognized as important. However, their policy framework is not fully turned to it. They are often not very gender sensitive. The integration of Asian civil society cosmo-vision, traditional/local institutions and knowledge rarely gets any mention. The policies and the legal and administrative framework to implement them remain fragmented. In addition, integrating the participatory aspect of WM as well as advanced knowledge requires serious attention e.g. urgent need to integrate the participatory planning, monitoring, evaluation and implementation processes.

5 Challenges of soil and water conservation in 21st century

- Challenge 1 Magnitude plan objective for soil and water conservation
  In 1998, a national overall short, medium and long- term plan for soil and water conservation have been worked out. To achieve the planned objective will be the great challenge for soil and water conservation work. The details of plans are shown in Table 2.

Table 2 Plan of national SWC in short, medium and long term

Plan	Duration	New control area (km^2)	Desert area to be controlled (10^6ha)	New terraces (10^6ha)	New forestland (10^6ha)	New grassland (10^6ha)	Forest coverage to be reached (%)
Short term	2001—2010	60	22	6.7	39		
Medium term	2011—2030	60% total eroded area	40		40	80	24
Long-term	2031–2050	100% total eroded area			Green mountain	Clean water	26

- Challenge 2 Achieve people's positive participation in planning and decision making in WM
  To achieve people's participation in planning of WM will be very harsh efforts for soil conservation work in 21st century. The following constraints at policy level should be resolved.

  Among the GO/NGO participatory development programs are still not widely used in China. These agencies were established for top down transfer of technologies and know-how. Participatory WM programs being new to the conventional implementing agencies, old and outdated policy frameworks are being used to implement participatory programs while their human resources are not yet fully prepared. Limited, little or no consultation on the development of the policies with the concerned public. Thus the policies do not reflect effected public's views. Administrative and legal framework although available but scattered among different sectors. Participatory programs require dedicated individuals as facilitators. The present day institutions may not be providing favorable climate for such individuals (P.M.Sharma).
- Challenge 3 Ensure ownership of programs and usufruct rights of natural resources to local communities

In the recent past there has been a clear recognition that a sense of belonging and ownership of the natural resources is essential if they are to be well managed by people. The question of ownership of the programs and project is born out of the fact that most present day development programs do not often give a sense of belonging to the people for whom they are meant. To avoid such a sad state, the policy should ensure that the development programs are planned, implemented, monitored, evaluated and their funding is in the hands of the local village level institutions.

References

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