

8. Aspects that enable the KNNL to implement projects with greater efficiency

The following aspects have enabled the KNNL to implement projects with a greater degree of efficiency:

- Mobilization of funds through market borrowing with guaranteed support from the government. Although the payment of interest and principal amount is guaranteed and supported through state budgetary resources, the mobilization of funds required the company to establish management efficiency for obtaining sanctions from the borrowing agency.
- Engagement of consultants from the open market for various activities.
- Reforms in the tendering process.
- Operational reforms.
- Problem-solving approaches at review meetings.
- Delivering quick decisions on issues posed by field officers — shedding the bureaucratic approach.
- Close monitoring of annual work plans at periodic meetings.
- Prioritization of projects/work to be executed with regard to the creation of irrigation potential.
- The KNNL now has the onus for implementation of the projects transferred to its jurisdiction; this has naturally given impetus to the governing body and the chief executive to make every effort to deliver as they will be identified with any success or failure.

9. Corporate effectiveness surpasses government administration

Using a corporation to implement massive projects in the public domain, such as irrigation projects, has the effect of achieving better results through efficient management that could not be expected from de facto governmental administration. Some benefits are described hereunder:

- There is avoidance, to some extent, of direct pressure being introduced for purely personal or sectarian interests in the implementation of projects.
- Corporate law is common across all enterprises, whether public or private. With regard to management, auditing and accounting, the corporation is required to comply with prescribed standards without claiming any special dispensation as a government body. Therefore a corporate structure automatically drives the institution towards better accountability and performance. This facilitates funding and creates the need for the institution to be accountable and transparent; for example by ensuring that allocated or raised resources are utilized for the purpose for which they had been provided.

10. Ways to make the KNNL more effective

Although there are distinct advantages in using the corporate model for implementing irrigation projects, nevertheless, in our experience these advantages can be further optimized if the following issues are also addressed:

- The government tends to maintain full control on the human resources deployed within the corporation by retaining the power to transfer and post officers deputed to work in the corporation. If the governing body and its CEO are given full control over human resource deployment, the corporation will be able to achieve much better results. In other words it is desirable for the corporation to have full control of its employees, even if they are on loan from the government. Over time, the corporation must develop its own team of employees. If this is not done, attitudinal and cultural changes cannot be generated within the corporation.
- In its anxiety to expedite work based on political influence, sometimes the corporation is forced to overlook established priorities/feasibility in undertaking specific activities.
- In a government-owned corporation, the effective role of the CEO is invariably subordinated by his relationship with the other members of the Board of Directors as well as the government. Therefore,

a minimum tenure of three years for any CEO is an essential factor in making the corporation effective and successful.

- It is also a debatable issue whether the Board should predominantly constitute professionals or civil servants. A balance has to be maintained by introducing professional advice and guidance with regard to policy-making. At present the strongest feature of the KNNL is the presence of the Chief Minister as the head of the Board; this gives the corporation the strongest political will. Adding more professionals in the fields of management and finance would help the organization towards fine-tuning standards and practices comparable to counterparts elsewhere in the world.



Figure 2. States and union territories in India

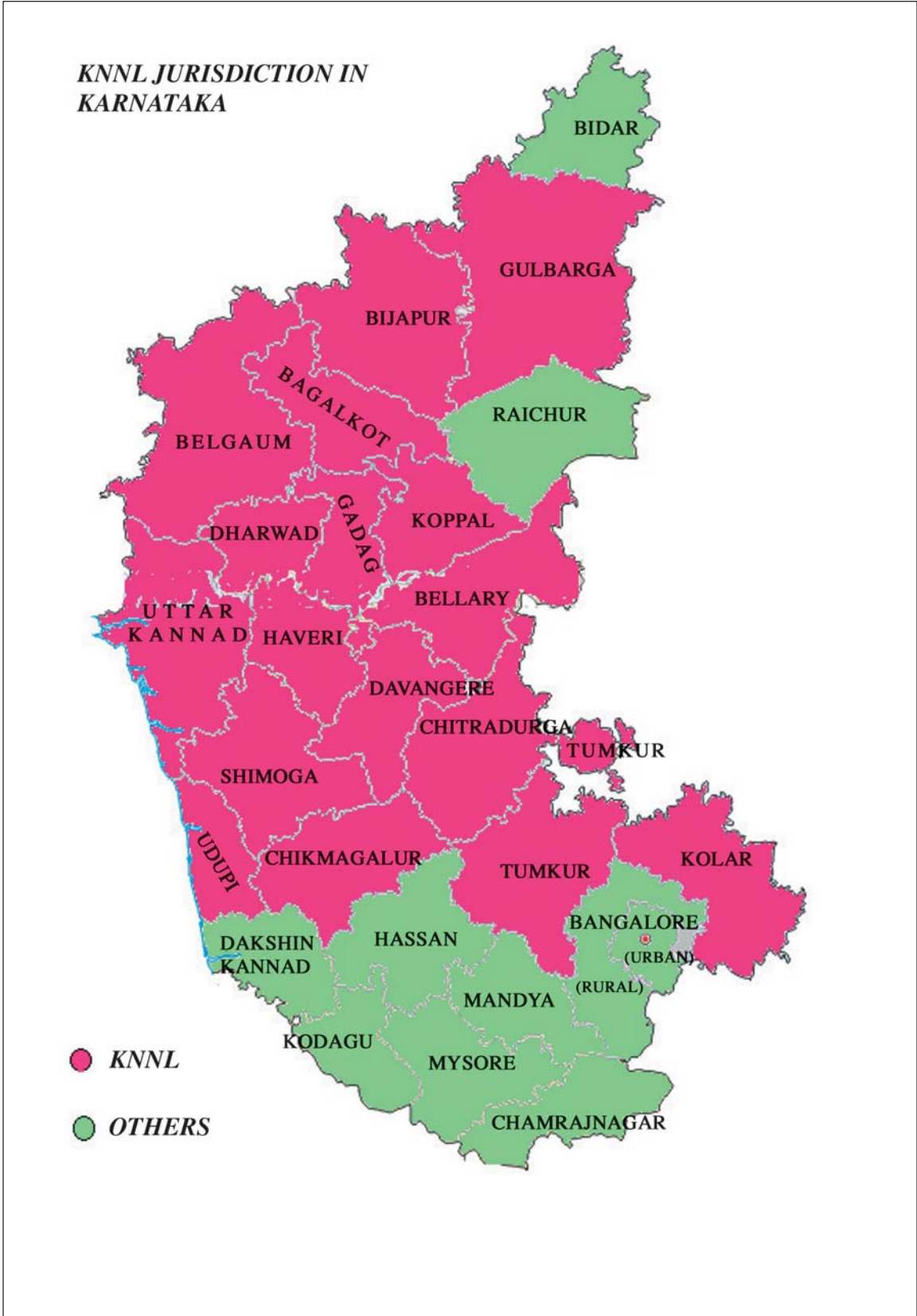


Figure 3. Districts in Karnataka where KNNL projects are located

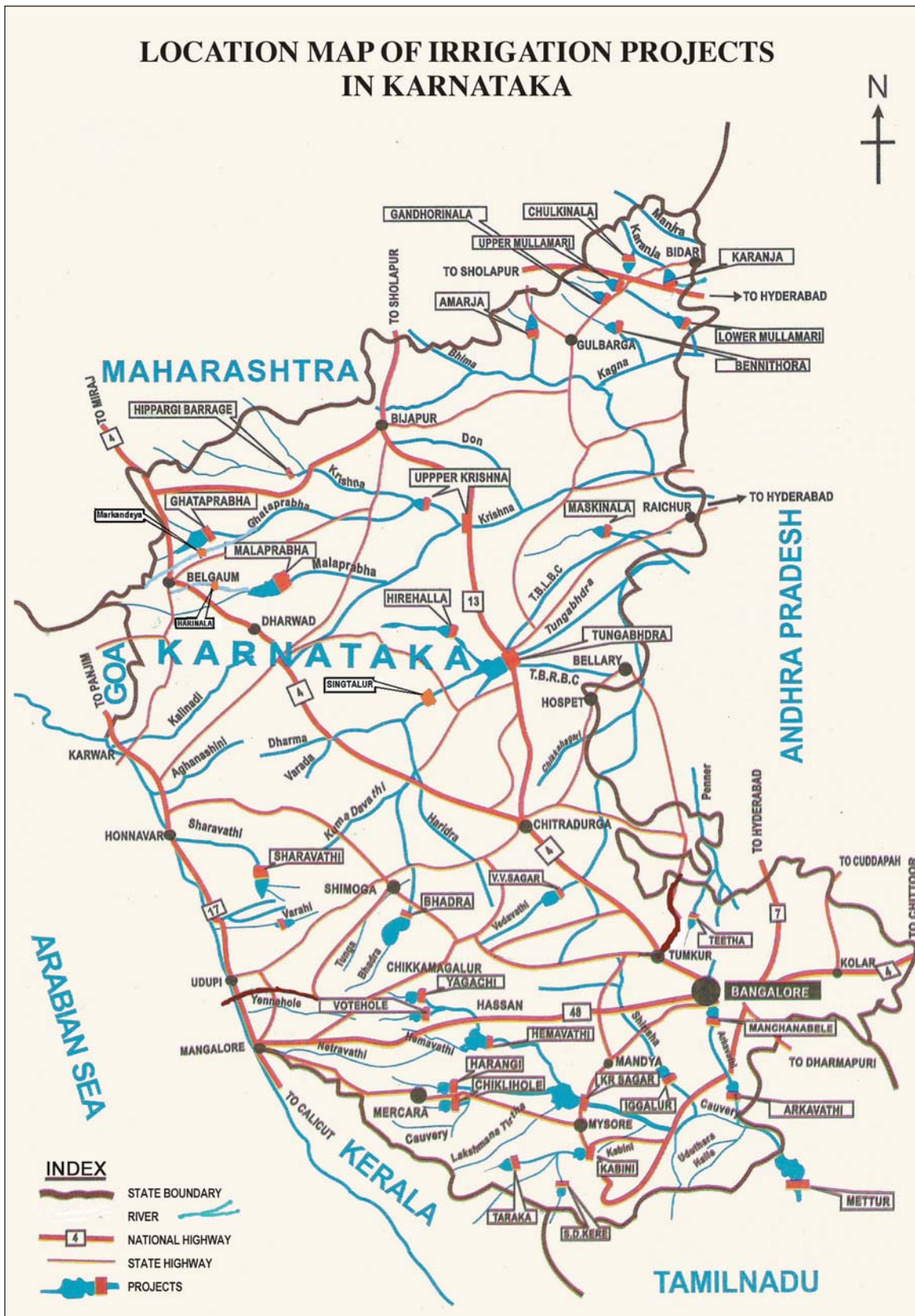


Figure 4. Location of irrigation projects in Karnataka

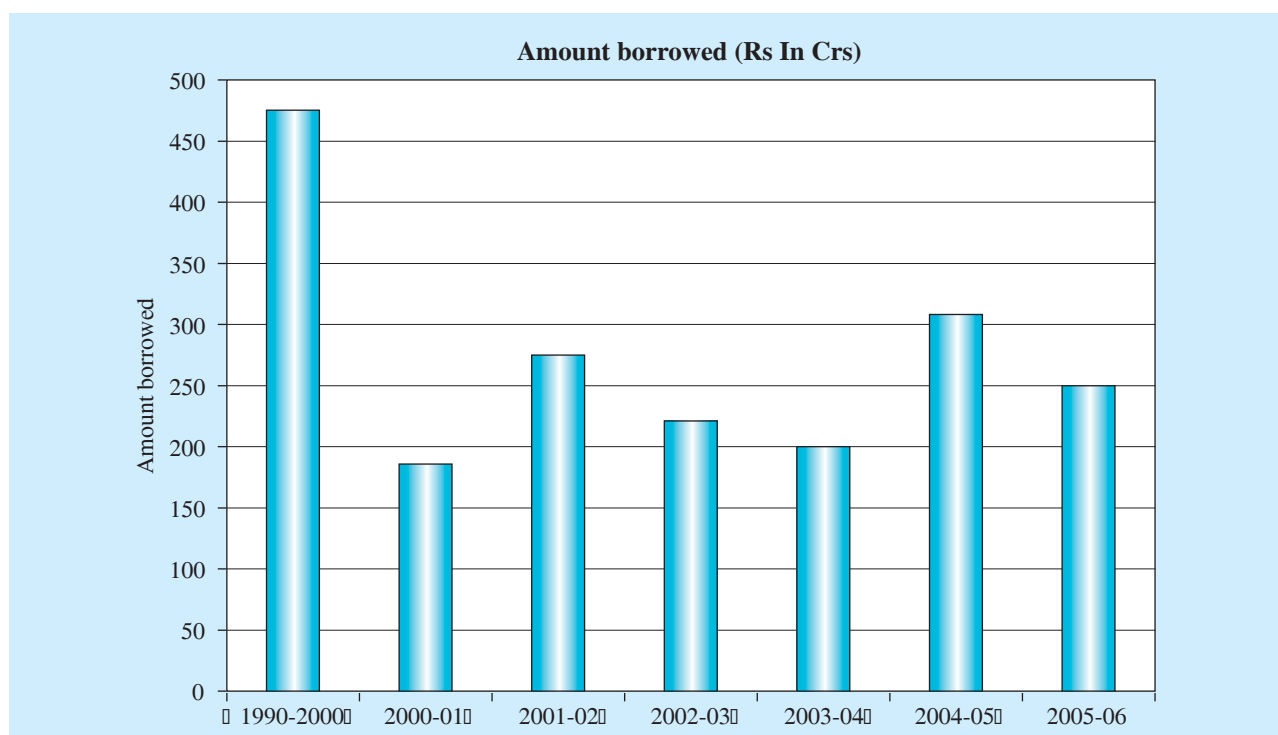


Figure 5. KNNL's borrowings profile

11. Brief details of bonds and term loans in KNNL

- KNNL had authorized share capital of Rs3 000 *crores* as of 31 March 2006.
- KNNL borrowed Rs1 915.05 *crores*, consisting of Rs1 445.05 *crores* from bonds and Rs470 *crores* from term loans from 1999 to March 2006.
- KNNL has repaid Rs780.97 *crores* by way of exercising call options on high cost borrowings.
- The coupon rate/interest on bonds varies from 13.25 to 7 percent.

Note: Reset: Interest is reset as per terms of issue. Regular: Interest fixed for entire tenure of bonds.

Table 2. Details of bonds and term loans

Year	Particulars	Rate of Interest (%)	Amount (Rs. <i>crores</i>)	Status
1999-2000	Series – I Regular	13.00	141.13	REPAID
	Series – I Reset	13.25	119.76	REPAID
	Series – II Regular	12.75	209.88	REPAID
	Series – II Reset	12.40	4.55	REPAID
2000-2001	Series – III Regular	13.00	185.65	REPAID
2001-2002	Series – IV Regular	11.75	186.18	
	Series – IVA Regular	11.40	88.80	
2002-2003	Series – V Regular	10.66	174.20	
	Series – VA Regular	9.70	46.90	
2003-2004	Series – VI Regular	6.70	200.00	
2004-2005	Series – VII Regular	6.95	88.00	
	Term loan	7.00	120.00	REPAID
	Term loan	7.00	100.00	
2005-2006	Term loan	7.00	250.00	

- The bonds are rated LA+ (SO) as awarded by the independent rating agency M/s ICRA Ltd.
- The GoK has guaranteed Rs1 915.05 crores as of 31 March 2006 against KNNL bonds through budgetary provisions.
- The GoK provides budgetary support for timely payment of principal and interest payments on bonds and term loans.
- A designated escrow mechanism is in place for debt servicing of bonds.
- Bonds are traded on the National Stock Exchange.
- M/s Indusind Bank acts as trustees for KNNL bond holders.
- The assets of the company — x 1.25 — have been pledged in favour of trustees, bond holders etc.
- Term loans are borrowed from banks/financial institutions.

Table 3. Comparison of bonds and term loans

Bonds	Term loans
Borrowing in a single stretch	Borrowing in a phased manner
Interest is payable from Date of Allotment	Interest payable from the date of borrowing
No. of investors is high	One or more banks/financial institutions
Time consumption	Less time consumption compared to bonds
Involves more procedures	Involves less procedure
Rating is mandatory	Rating is not mandatory
Trustees, registers of companies, collecting bankers are necessary	Not required
An escrow mechanism is necessary	Not required
Extra cost on arrangers, National Securities Depository Ltd. (NSDL) and LTA (Loss Time Accident) fees	Not required
Listing is mandatory	Not required
Much correspondence is required	Less correspondence compared to bonds

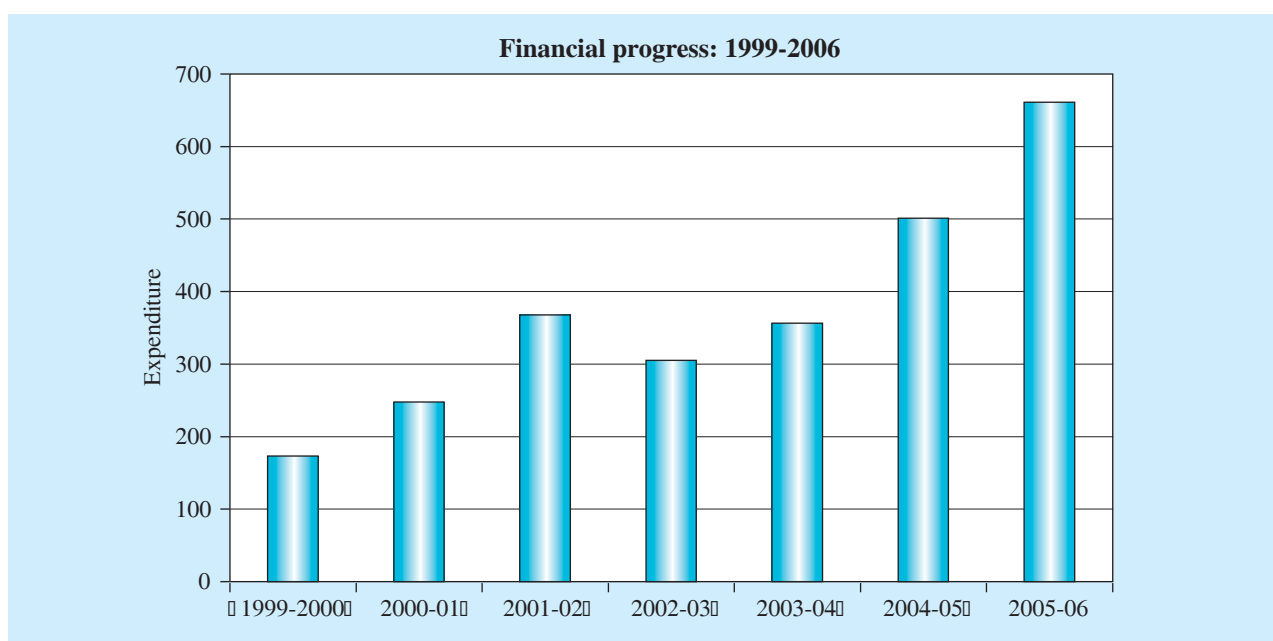


Figure 6. KNNL's financial progress: Money spent on various projects (in crores)

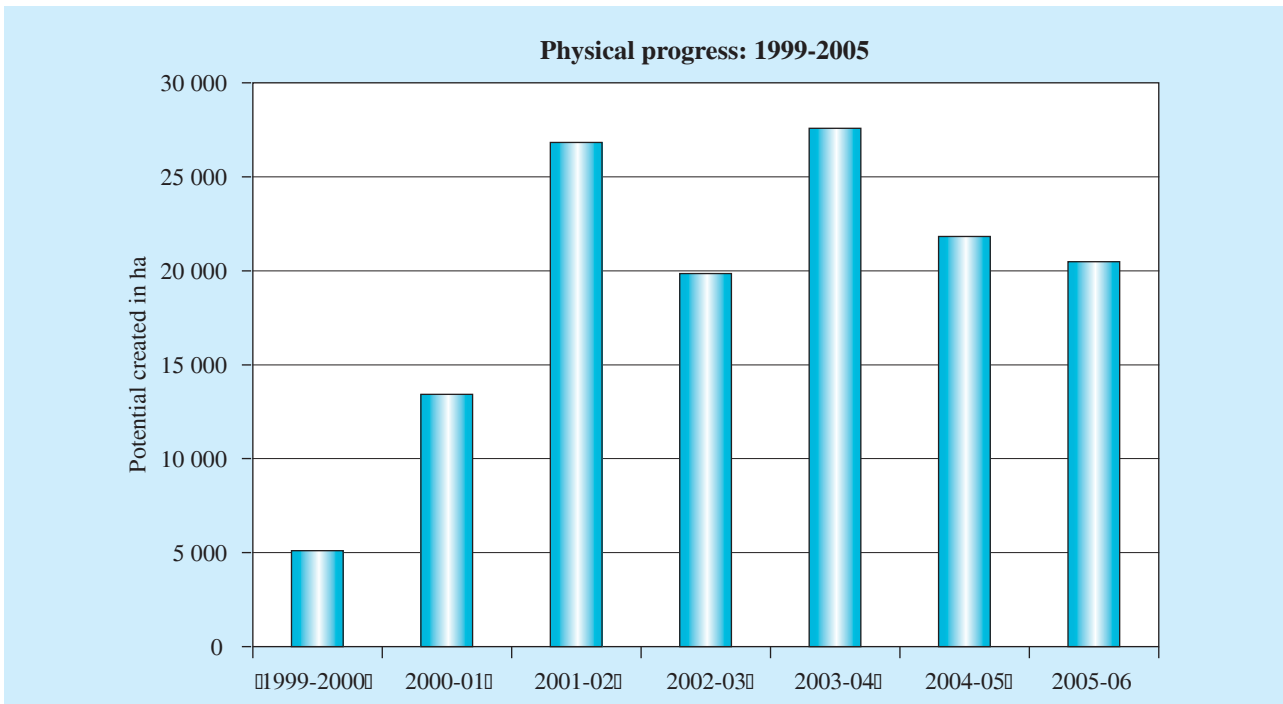


Figure 7. Physical progress — potential created

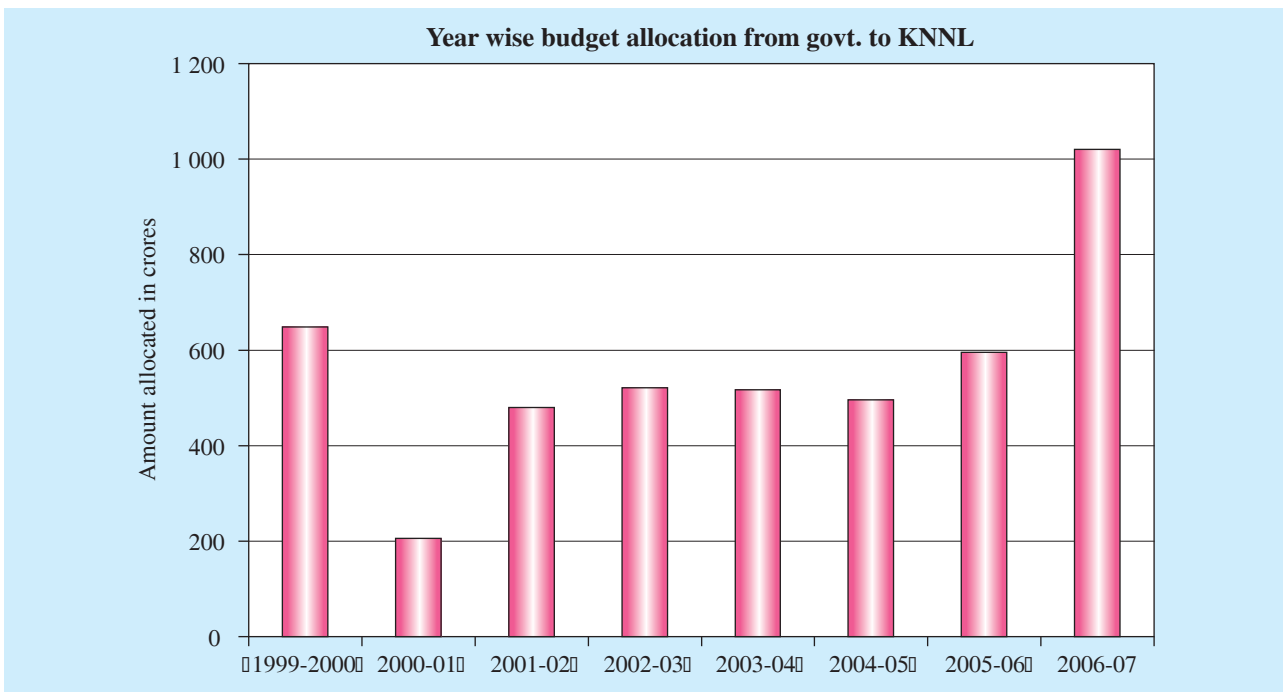


Figure 8. Year-wise budget allocation (in crores)

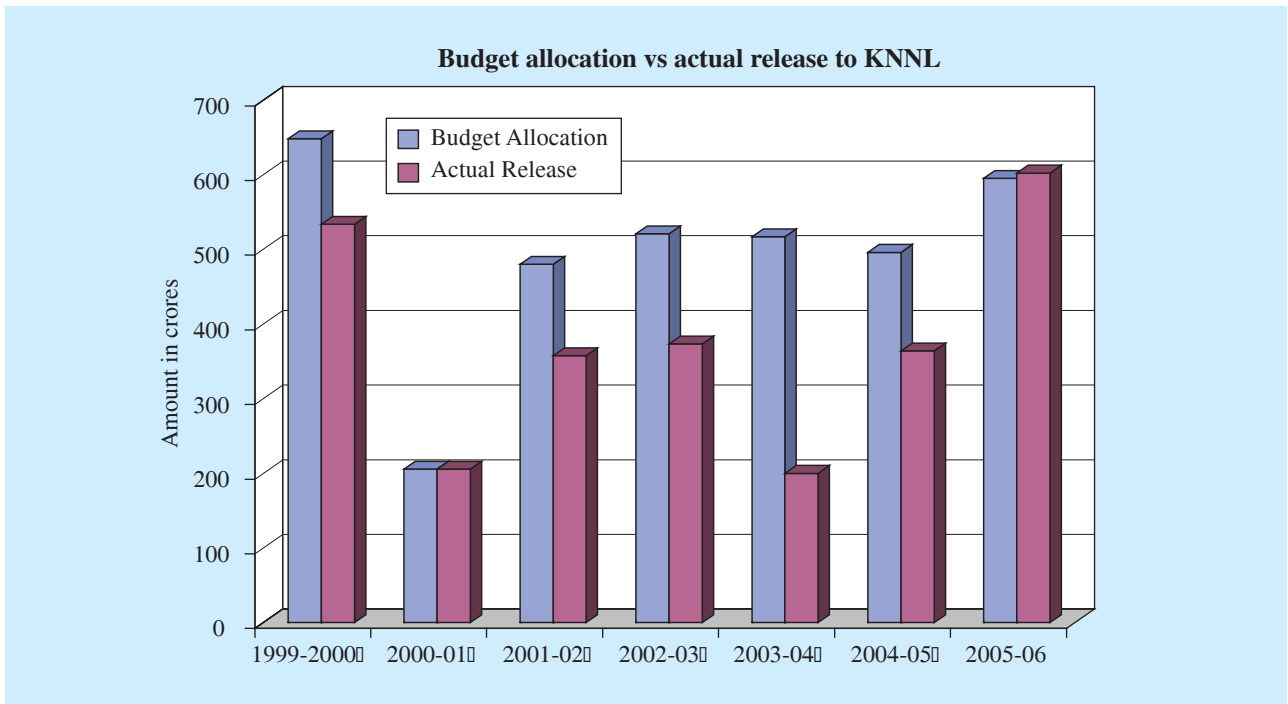


Figure 9. Budget allocation vs actual releases (in crores)

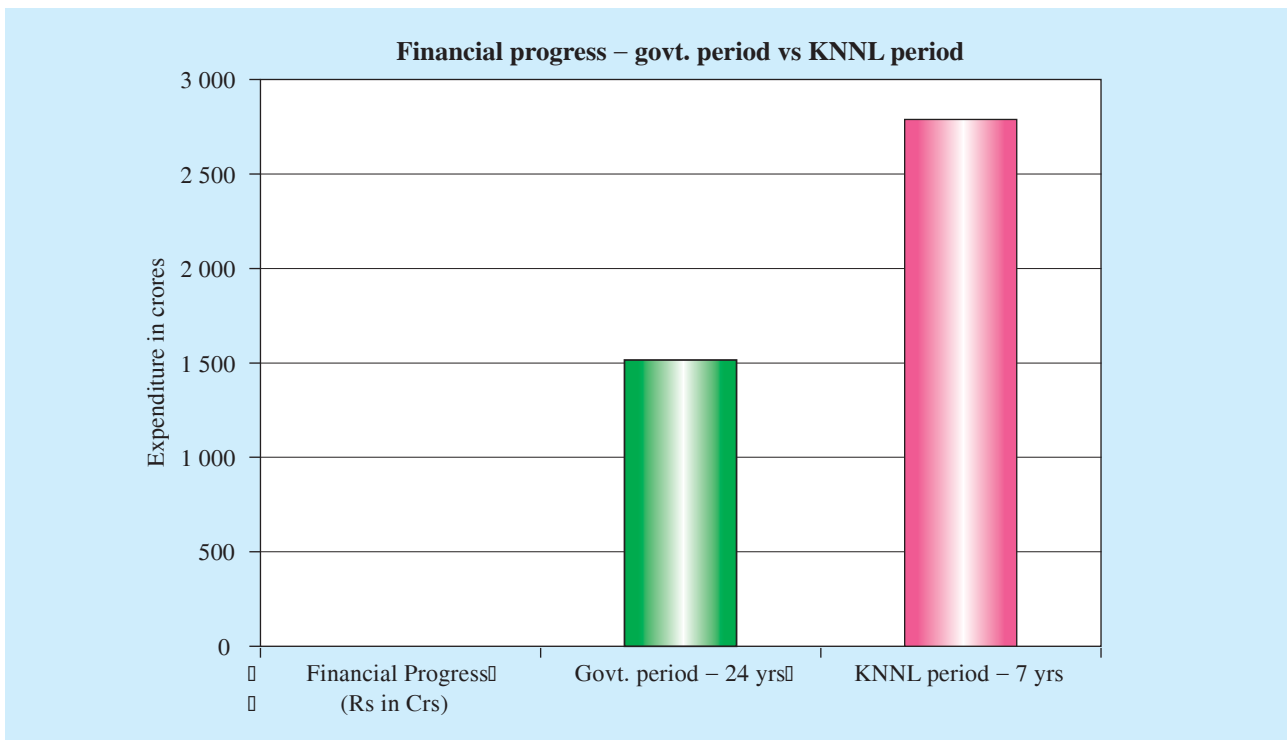


Figure 10. Financial progress – comparison to the pre KNNL period

12. KNNL and its efforts towards modernization of irrigation management

12.1 RAP–MASSCOTE workshop details

As a starting point for the development of a modernization plan for irrigation management, a RAP–MASSCOTE workshop was organized in Belgaum, Karnataka from 9 to 19 October 2006 with the help of Daniel Renault, Thierry Facon and P.S. Rao from FAO–RAP. Around 32 engineers participated in the workshop and a detailed assessment of the 124-km length of the Ghataprabha Left Bank Canal was done. The RAP results are being analysed to apply some of the findings. The system requires certain corrections including the introduction of volumetric assessment of water at various locations and addressing the issue of perturbation in the downstream Biligi branch canal. The workshop also highlighted the need for balancing the water accounts so that the irrigation management can convert from supportive to protective irrigation. The RAP representatives also addressed water users' associations and the Federation of Water User Societies. Certain observations were made which require the attention of policy-makers and decisions at the policy level.

12.2 Policy issues that emerged from the RAP–MASSCOTE workshop

Five policy issues emerged from the RAP–MASSCOTE workshop:

1. A revised approach to hydraulic equity.
2. Accept the need for flexible cropping patterns.
3. Shift from protective to productive irrigation.
4. Service-oriented management (SOM) and explicit integrated water research management (IWRM).
5. Revisiting the concept and practices of “payment for water services”.

12.3 FAO's role in the KNNL's road map

FAO has been helping the KNNL to launch its modernization plans for irrigation in Karnataka. A series of workshops is planned for other projects in coming months and a typology of the 39 systems will be developed to help build a strategy for the whole Karnataka irrigation command area.

December 2006: A workshop will be held in Bennithora and Gandorinala projects in Gulbarga.

January 2007: Another RAP–MASSCOTE workshop will be organized in the Upper Tunga Project, Shimoga.

July 2007: A national level workshop on “Reforms in Irrigated Agriculture Management” in collaboration with the Central Board of Irrigation and Power and FAO will be held in New Delhi.

The results of these workshops will be tested in the *kharif* and *rabi* seasons of 2007 and early 2008 and an international workshop is planned. It is expected that by that time we will be able to concretize our policy prescriptions which will enable the KNNL to re-engineer to serve farmers better by modernizing its irrigation management systems.

Bibliography

Karnataka Neeravari Nigam Ltd. 1999. Memorandum of Association & Articles of Association of the Karnataka Neeravari Nigam Ltd.

Karnataka Neeravari Nigam Ltd. 2000–2005. *Annual reports of the Karnataka Neeravari Nigam Ltd.*

Renault, D. & Facon, T. (with inputs from Burke, J.). 2006. *Mapping the policy issues for modernization of irrigation management Karnataka Neeravari Nigam Limited (KNNL).*

APPENDIXES

APPENDIX 1. PROGRAMME

Programme of the International Forum on Water Resources Management and Irrigation Modernization in Shanxi Province, China

(22–24 November 2006)

Time	Activities	Remarks
21 November		
Whole day	Registration	Venue: Fifth floor Shanxi World Trade Hotel, Taiyuan
22 November		
Morning	Session 1: Opening	Venue: Shanxi World Trade Hotel, Taiyuan
08:30–09:00	Opening	Chairperson: Mr Liang Bin Vice-Governor of Shanxi Province Rapporteur: Mr Herve Plusquellec Former World Bank Irrigation Adviser
08:30–08:45 (1)	Address by Shanxi Provincial Government	Mr Liang Bin on behalf of Mr Yu Youjun the Governor of Shanxi Province
08:45–09:00 (2)	Address by FAO	Ms Jiang Han on behalf of Ms Victoria Sekitoleko, FAO Representative for China, Mongolia and DPR Korea
09:00–09:20 (3)	Establishing water saving society at all-front, promoting sustainable development of Shanxi Province	Mr Hu Siyi, Vice-Minister Ministry of Water Resources, China
09:20–09:40 (4)	Key trends affecting irrigated agriculture and policy options	Mr Jean-Marc Faurès Senior Water Resources Management Officer, FAO
09:40–10:10 (5)	Water project and ecology environment	Mr Suo Lisheng, Former Vice-Minister Ministry of Water Resources, China
10:10–10:30	Tea/coffee break	
	Session 2: Plenary presentations	Chairperson: Mr Bruno Molle CEMAGREF, France Rapporteur: Mr Dong Bin Associate Professor of Wuhan University
10:30–10:50 (1)	China national policy on irrigation development	Mr Li Daixin Director-General, Department of Irrigation, Drainage and Rural Water Supply, MWR
10:50–11:10 (2)	Irrigation development and modernization in China	Mr Gao Zhanyi Vice-President of ICID Vice-President of CNCID
11:10–11:30 (3)	Construction of new countryside and related water issues	Mr Li Xirong, Deputy Director-General, Policy Research Office of the State Council
11:40–12:00 (4)	Water resources management and agricultural irrigation in Shanxi Province	Mr Pan Junfeng, Director-General Shanxi Water Resources Department

12:00–13:30	Lunch break	
Afternoon	Session 3: Subtheme meetings	
	Subtheme Meeting I: Options for Strategic and Policy Innovations at River Basin Level	Chairperson: Mr Yan Yong Director, Division of Water Resource Planning Department of Water Resources, MWR Rapporteur: Mr Lebdi Fethi Director National Agronomy Institute of Tunisia
13:30–13:50 (1)	Technical issues involved in modernizing farm irrigation system: some experiences in Mediterranean countries	Mr Bruno Molle CEMAGREF
13:50–14:10 (2)	Integrating urban and rural plans, guiding by typology, promoting new countryside construction	Mr Zhang Zhongfa Research Fellow, Ph.D. Tutor, Development Research Center of the State Council of China
14:10–14:30 (3)	Pathways for realizing whole of the irrigation system water saving	Mr Shahbaz Khan Regional Coordinator of UNESCO IHP-HELP
14:30–14:50 (4)	Notions and scientific methods for optimal regional water resources allocation	Dong Zengchuan, Professor He Hai University, China
14:50–15:10	Questions and clarifications	
15:10–15:30	Tea/coffee break	
15:30–15:50 (5)	Water and irrigation management in the water stress Zayandeh-Rud and Karkheh River Basin, Iran	Mr Nader Heydari Basin Coordinator for the CPWF project, Karkheh, I.R. Iran
15:50–16:10 (6)	River basin water resources allocation and its implication on local environment	Pei Yuansheng, Professor IWHR, China
16:10–16:30 (7)	Water management strategy and irrigated areas modernization-Tunisian Case	Prof Lebdi Fethi, Director National Agronomy Institute of Tunisia
16:30–16:50 (8)	Ideas on irrigation modernization	Sun Xihuan, Professor Taiyuan Technical University
16:50–17:10	Questions and clarifications	
	Subtheme Meeting II: Options for technical and managerial improvements at system and farm level	Chairperson: Mr Chen Zhijun Water Resources Development and Conservation Officer, FAO RAP Rapporteur: Mr Shahbaz Khan Regional Coordinator of UNESCO IHP-HELP
13:30–13:50 (1)	The impacts of water pricing reform on agriculture irrigation in China	Mr Li Yangbin, Director-General China Irrigation and Drainage Development Centre
13:50–14:10 (2)	Technical options at system level: canal lining and canal operation control	Mr Herve Plusquellec Former World Bank Irrigation Adviser, France/USA
14:10–14:30 (3)	Practices of modern management at Jiamakou Irrigation Scheme	Mr Zhang Xuehui, Director-General of Jiamakou Yellow River Diversion Administration Bureau

14:30–14:50 (4)	A rapid appraisal procedure to assess the performance of irrigation systems: lessons from a FAO regional irrigation modernization and management training programme in Asia		Mr Thierry Facon Senior Water Management Officer, FAO RAP
14:50–15:10	Questions and clarifications		
15:10–15:30	Tea/coffee break		
15:30–15:50 (5)	Participatory management and farmer water users organization		Mr Feng Guangzhi President, China Association of Irrigation Schemes
15:50–16:10 (6)	Modernization of irrigation canals		Mr M.K. Goyal, Consultant Tahal Consulting Engineers, India
16:10–16:30 (7)	Position and role of pumping station in water resources management and irrigation modernization		Dou Yisong, Professor IWHR, China
16:30–16:50 (8)	The complexity of PLC-based canal automation		Mr Charles M. Burt, Professor and Chairman Irrigation Training and Research Centre (ITRC), California Polytechnic State University, USA
16:50–17:10 (9)	Karnataka Neeravari Nigam Ltd. (KNNL)-a corporate model and growth engine in water resources development		Mr D. Satya Murty Managing Director Karnataka Irrigation Corporation Ltd./India
17:10–17:30	Questions and clarifications		
23 November	Session 4: Field visits (split into three groups)		Travel from Taiyuan to Yuncheng by car
Whole day	Group 1: Visit surface water irrigation system at Jiamakou Irrigation Scheme	Group 2: Visit groundwater irrigation system in Pinglu County	Group 3: Visit water-harvesting irrigation system in Yanhu District
24 November	Group discussion and plenary conclusion		Venue: Jin Xin Hotel, Yuncheng
Morning	Session 5-Group discussions		
	G1: Surface water irrigation Facilitator: Mr Zhang Xuehui Rapporteur: Mr D. Satya Murty	G2: Groundwater irrigation Facilitator: Mr Pei Qun Rapporteur: Mr Jean-Marc Faurès	G3: Water-harvesting irrigation Facilitator: Mr Sun Xihuan Rapporteur: Mr Shahbaz Khan
08:30–10:00	Topic 1: Current status and future trends of surface water irrigation in Shanxi Province. Topic 2: Strategy and objective for modernization of surface water irrigation in Shanxi Province	Topic 1: Current status and future trends of groundwater irrigation in Shanxi Province. Topic 2: Strategy and objective for modernization of groundwater irrigation in Shanxi Province	Topic 1. Current status and future trends of water-harvesting irrigation in Shanxi Province. Topic 2: Strategy and objective for modernization of water-harvesting irrigation in Shanxi Province
10:00–10:30	Tea/coffee break		
10:30–11:30	Plenary group reporting and discussion		Chairperson: Mr Thierry Facon
11:30–12:30	Group discussions		
	G1: Topic 3: Measures and options for modernization of surface water irrigation in Shanxi Province	G2: Topic 3: Measures and options for modernization of groundwater irrigation in Shanxi Province	G3: Topic 3: Measures and options for modernization of water-harvesting irrigation in Shanxi Province

12:30–13:30	Lunch break		
Afternoon	Group discussions		
13:30–14:45	Topic 3: Measures and options for modernization of surface water irrigation in Shanxi Province	Topic 3: Measures and options for modernization of groundwater irrigation in Shanxi Province	Topic 3: Measures and options for modernization of water-harvesting irrigation in Shanxi Province
14:45–15:00	Tea/coffee break		
	Session 6: Conclusion	Chairperson: Mr Thierry Facon Rapporteur: Mr Gao Zhanyi	
15:00–15:30	Subtheme meeting reporting		
15:30–16:10	Group reporting		
16:10–16:50	Plenary discussion and adoption of forum conclusions		
16:50–17:10	Tea/coffee break, photograph		
	Session 7: Closing	Chairperson: Mr Pan Junfeng	
17:10–17:25 (1)	Address by Shanxi Provincial Government	Mr Liu Weijia, Assistant Governor of Shanxi Province	
17:25–17:40 (2)	Address by FAO RAP	Mr Thierry Facon, Senior Water Management Officer, FAO RAP	
25 November	Site tours to Yuncheng and Xi'an cities		

APPENDIX 2. PARTICIPANTS

Name	Organization/country	Position/title	Contacts
1. National and provincial government officials			
Mr Hu Siyi	Ministry of Water Resources, China	Vice-Minister	
Mr Liang Bin	Shanxi Provincial People's Government	Vice-Governor	
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7. Participants from divisions of SWRD			
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Mr Li Qiantai	Division Policy and Legislation, SWRD	Director	
Mr Chen Zhiping	Division of Finance and Economy, SWRD	Director	
Mr Li Li	Division of Planning and Programming, SWRD	Director	
Mr Zhang Jianzhong	Division of Construction, SWRD	Director	
Mr Bai Xiaodan	Division of Rural Water Conservancy, SWRD	Director	
Mr Wu Fuyu	Division of Water Supply and Sanitation, SWRD	Director	
Ms Sun Xiaoping	Division of Water Conservancy Management, SWRD	Director	
Ms Sun Junmei	Division of Science, Technology and Foreign Affairs, SWRD	Director	
Mr Zhang Yunling	Bureau of Fishery, SWRD	Director	
Mr Li Junzhi	Division of Personnel, Labour and Education, SWRD	Deputy Director	
Ms Zhu Huimin	CCP Party Committee, SWRD	Deputy Secretary-General	
Mr Wu Shuanghai	Inspector's Office, SWRD	Director	
Mr Li Tianshe	Division of Public Security, SWRD	Deputy Director	

8. Participants from organizations directly affiliated to SWRD			
Mr Li Luxiu	Water Resources Office, SWRD	General Engineer	
Mr Zhang Wenzhong	Water Resources Office, SWRD	Deputy General Engineer	
Mr Yan Demei	Water Resources Office, SWRD	Section Chief	
Mr Zhang Gailong	College of Water Conservancy Staff, SWRD	Deputy President	
Mr Xing Yutai	Flood Protection Office, SWRD	Director	
Mr Cheng Yuanshen	Flood Protection Office, SWRD	Deputy Director	
Mr Tian Xinshen	Hydrology Bureau, SWRD	Deputy Director	
Mr Xiao Gan	Fenghe Reservoir Management Bureau	Director-General	
Mr Du Xiangrun	Fenghe Reservoir Management Bureau	General Engineer	
Mr Yao Haiping	Zhangze Reservoir Management Bureau	Director-General	
Mr Wei Guo	Zhangze Reservoir Management Bureau	Deputy Director-General	
Mr Song Jinhua	Management Bureau of the Second Fenhe Reservoir	Director-General	
Mr Guo Jianxin	Hydraulic and Hydropower Design Institute, SWRD	Director	
Mr Jia Youchai	Water Conservancy Academy, SWRD	Secretary-General	
Mr Rong Zhijun	Water Conservancy Academy, SWRD	Deputy Director	
Ms Li Qiaoxia	Water Resource Research Institute, SWRD	Director	
Mr Wu Quansheng	Water Conservancy Construction Center, SWRD	Director	
Mr Wang Zhengping	Water Conservancy Construction Center, SWRD	General-Engineer	
Mr Zhao Zhitong	Information Center, SWRD	Director	
Mr Ding Gengbiao	Information Center, SWRD	Deputy Section Chief	
Mr Liu Gaiyuan	Water Saving Station, SWRD	Director	
9. Participants from the 10 large scale irrigation schemes in Shanxi Province			
Mr Liu Haozheng	Management Bureau of Fenghe Irrigation Scheme	Deputy Director-General	
Mr Wei Ping	Management Bureau of Xiaohe Irrigation Scheme	Director-General	
Mr Hou Yongsheng	Management Bureau of Zuncun Motor-powered Irrigation Scheme	Director-General	
Mr Yan Qingli	Management Bureau of Dayudu Motor-powered Irrigation Scheme	Director-General	
Mr Zhang Xuehui	Management Bureau of Jiamakou Motor-powered Irrigation Scheme	Director-General	
Mr Wang Peidao	Management Bureau of Jiamakou Motor-powered Irrigation Scheme	Deputy Director-General	
Mr Di Dejun	Management Bureau of West Fenghe Irrigation Scheme	Director-General	

Mr Li Sou	Management Bureau of Wenyuhe Irrigation Scheme	Director General	
Mr Fan Jianhua	Management Bureau of Chetian Irrigation Scheme	Director-General	
Mr Guo Yaohan	Management Bureau of Shangganhe Irrigation Scheme	Director-General	
Mr Gao Jianjun	Management Bureau of Hutuohe Irrigation Scheme	Director-General	
10. Other participants			
Participants from SWRD: 53 civil servants			
Participants from Taiyuan Technology University: 20 professors, lectures and students			

APPENDIX 3. FORUM SECRETARIAT

Secretary-General

Mr Liu Weijia, Assistant Governor of Shanxi Provincial People's Government, China

Deputy Secretary-General

Mr Thierry Facon, Senior Water Management Officer, FAO RAP

Mr Pei Qun, Deputy Director-General, SWRD

Secretariat members

Mr Zhijun Chen, Water Resources Development and Conservation Officer, FAO RAP

Mr Chen Zhiping, Director of Finance and Economy Division, SWRD

Mr Hu Jian, Director of General Affairs Office, SWRD

Mr Bai Xiaodan, Director of Rural Water Conservancy Division, SWRD

Ms Sun Junmei, Director, Division of Science, Technology and Foreign Affairs, SWRD

Mr Zhujia, Deputy Director, Division of Science, Technology and Foreign Affairs, SWRD

Working staff

Mr Li Yingfang, Deputy Director of General Affairs Office, SWRD

Mr Guo Tianen, Deputy Director of Rural Water Conservancy Division, SWRD

Ms Zhou Lifang, Deputy Director of Rural Water Conservancy Division, SWRD

Ms Liu Xiao, General Affairs Office, SWRD

Ms Wang Dexiang, General Affairs Office, SWRD

Mr Ma Laixi, Rural Water Conservancy Division, SWRD

Ms Wang Jinping, SWRD

Ms Pan Cuining, SWRD

Mr Gong Menjian, SWRD

Mr Chang Jianzhong, SWRD

Ms Shi Jingfang, SWRD

Mr Zhang Wenliang, SWRD

Mr Wang Hongliang, SWRD

Mr Zhang Bo, SWRD

Mr Zhang Hui, SWRD

Mr Chang Zhenghua, SWRD

Ms Zhao Aiping, SWRD

Ms Chen Bo, SWRD

Ms Zhang Xun, SWRD

Ms Hu Yan, SWRD