FARMER MANAGED IRRIGATION SYSTEMS IN NEPAL AT THE CROSSROAD[**]

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Abstract

In Nepal, Farmer Managed Irrigation Systems (FMIS) occupy special status in the national economy and food security system. Out of irrigated area in Nepal, almost 70% fall under farmer managed irrigation systems. They are the vibrant systems. The history of FMIS is long and they are still active institutions in Nepal. Hence, FMIS are the national heritage of Nepal. Secondly, FMIS are the symbol of democratic values. The community owning the systems manages the resources on their own. They evolve the rules and regulations on their own and implement them with consensus within the community. Hence, FMIS has a special place in irrigated agriculture in Nepal.

The irrigation sector in Nepal is facing new challenges. FMIS is not exception. FMIS is facing the challenges brought by population growth, pressure for increased demand on food, environmental degradation and unavailability of local construction materials and competition on the allocation of water.

FMIS is at the crossroad. There are both internal and external challenges to FMIS. The internal challenges are of design , of construction materials due to the depletion of the local construction materials, competition on the use of water, stagnated economic development, new legislation either ignored the existence FMIS or attempt is made to bring these systems under the control of local administration ignoring the need for development of polycentric system to strengthen the democratic values at the grassroots level and the process of assistance by the government to FMIS.

OVERVIEW OF IRRIGATION DEVELOPMENT:

There have been changes in the irrigation management over period of time. In 1960s, the increase in agriculture production was conceived by more investment in the irrigation infrastructure development. Around 1980s, it was found that irrigation infrastructures being built over period of time have been deteriorated. It is recognized that the participation of the beneficiaries is import for the better maintenance and management of the irrigation systems so there has been promotion of participatory irrigation management.

Irrigation has traditionally consumed a large proportion of the world's water. At the beginning of the century, 90% of water use in the world was for irrigation. By 1960, it was about 60% (Biwas 1993). In defense of this water use, Wallingford (1997) pointed out that irrigated agriculture produced 40% of food and agriculture commodities from 17% agriculture land. This makes food security critically dependent on irrigation. The dependence is most critical for Asia where 60% of food production is from irrigated lands. Similarly, long term impact has been felt in irrigation sector in Nepal.

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Many changes have been taking place. There has been increase in population growth. This has put more pressure for the increased demand on food. This situation puts more pressure in the irrigated agriculture. In 1990s it is recognized that water is a scarce resource and it will continue to be a scarce resource so increase of agriculture production per unit of water has to be increased. Hence, this new situation also puts pressure in the management of irrigation system for irrigated agriculture. Multiple use of water has increased so the same source is in competition with drinking water, irrigation and small hydropower. Drying of source of water of these systems due to depletion of forest coverage has contributed in the hardship of water availability. Climatic change has also contributed in the shortage of water for the use by the people.

IRRIGATION MANAGEMENT AS SOCIO-INSTITUTIONAL AND TECHNICAL ISSUE

Irrigation management is not only one-dimensional activity. It has multi-dimensional activities. They include managing organizations, which operate and deliver water. It also deals with farmer's organization, agriculture credit, extension services and market conditions and water right issues. Hence, irrigation management is to be seen as social, institutional and technical activities. It is no longer considered irrigation management only as technical problem. Changes in irrigation management mean the establishment of multi-disciplinary irrigation department open to the farmer's participation in irrigation management. The irrigation management changes also have to respond to the irrigated agriculture and increasing productivity per unit of water.

BACKGROUND OF FARMER MANAGED IRRIGATION SYSTEM IN NEPAL

Nepal portrays a rich tradition of community efforts in natural resource management especially in water resources, forestry, and pastures. Customary norms have delineated water as community resource with elaborate usufructory rights and community governance structures for the management and utilization of these resources by village societies. Apart from these community-based values and norms, state policies and practices have historically been conducive to reinforced community roles in natural resource management. The edict of King Ram Shah in the 17^{th} century mandated water resources related conflicts to be settled at the community level itself. Though such mediation had to take into account local power structures, it nevertheless allowed community initiatives and governance structures to evolve. In Nepal, over 70 percent of the irrigated agriculture is undertaken through farmer managed irrigation systems.

Both forestry and water resources in Nepal have been subject to various policies and programs spun by the government and multiple donors. In the irrigation sector, only as recent at the 1970s did farmer managed irrigation systems (FMIS) gain recognition

within the plans and policies of the state. Truly these FMISs have contributed to food and water security of the nation based primarily on community efforts mediated by their own power relations.

Nepalese farmers have, by and large, recognized the importance of water resources for centuries and have been constructing irrigation systems at their own initiative to intensify their agriculture production. Irrigation development in the country remained in the hands of the people for many years. This tradition has given birth to the FMISs scattered all over Nepal. These systems have developed their own rules, norms and procedures of management.

In the FMISs, farmers are responsible for all management activities, encompassing water acquisition from the source to delivery to the plant in the field and management of the system including the resource mobilization and management of resources for O&M. In most of the systems, the extent of the need for resource mobilization for O&M of the irrigation systems have influenced the structure of the organization.

In Nepal, FMIS occupies special status in the national economy and food security system. It is estimated that 40% of food production is produced out of 15,000 FMIS in hill areas and 1700 systems in the tarai of Nepal. Out of the irrigated area in Nepal, almost 70% fall under the FMIS. They are the vibrant systems. FMIS have long history and they are still active institutions in Nepal. Hence, FMIS are the national heritages like other national monuments of Nepal. Again, FMIS are the symbol of democratic values. The community owning the system manages the resources on their own. Hence, FMIS has special place in the irrigated agriculture in Nepal.

Farmers have developed their own irrigation systems taking account of geographical impediments and limited services from the government in the past. They have managed their systems by adjusting the operation to the soils, climate, topography and social structure of the particular location over a period of many years. These environmental conditions, which vary tremendously throughout Nepal, have contributed to different patterns of irrigation organization. In addition to distinctively different organizational patterns for the well defined tasks of water acquisition, allocation, and distribution, methods of system O&M, and organizational activities regarding conflict management, communication, resource mobilization and decision making vary. The various patterns of organization are also related to the physical type of irrigation system: hill, river valley, or Tarai system. (Pradhan, 1989).

ORGANIZATIONAL BASIS OF FMIS FOR RESOURCE MOBILIZATION:

The irrigation organization in FMIS evolved on its own without any external assistance. Hence, these organizations are indigenous ones, which evolved over period of time to manage the natural resources within their environment. During the evolution of these organizations, water distribution principles, water share, water rights, obligations,

and resource mobilization basis were evolved. The members of the FMIS water users associations internalized these principles.

No single factor or element brings water users together in an irrigation organization. Different systems have different elements, which arise as the prominent feature. Water right issues, resource mobilization, water distribution, a sense of belonging to the community, preservation of an individual's water right are different unifying factors. However, it is not necessary to have all these features present for an irrigation organization to function. In the following section, three prominent bases for resource mobilization for the management of these systems that are found across FMISs are described.

(1) Water as community property: an organizing force to mobilize resources for O&M.

The dynamics of the functioning of FMISs can be better understood from the perspective of common property resource management. Valuing water, as "Community Property" can become the organizing and unifying force for farmers in a given system. The effectiveness of an irrigator's organization can be placed on a continuum, ranging from anarchic to well organized depending on the collective interest in irrigation water. Non-compliance with rules for water acquisition, allocation and distribution, and resource mobilization results in "anarchic" application of irrigation water, where individual interest prevails over collective interest. In an well-organized system, irrigation-related tasks are performed collectively by the beneficiaries, or all individuals carry out group-agreements.

Anarchy in an irrigation system results where group norms and values are not observed. Water is then considered as a resource to be extracted for individual benefit on the basis of "might is right". In an anarchic situation, water allocation, acquisition, distribution and conflict resolution depend on individuals settling problems with other individuals. Generally, the more powerful and influential individuals are able to extract a larger share than others are.

In an well-organized system, the acquisition of irrigation water and its application for agriculture use are based on community decisions. Committee members are elected or selected to manage the system on behalf of the community and are accountable to it.

Water acquisition is usually a collective effort, i.e. the community pools its resources either in the form of cash or kind or labor to do this. The allocation principle is also decided collectively by the irrigator community. The distribution of water according to the criteria prescribed by the irrigator community is an effort to distribute the community resource for individual use. Limits are placed on the extent to which individuals are allowed to use these resources. Hence, water allocation and distribution become transparent in FMIS. In Agency-managed systems, water allocation is not usually transparent.

If some one violates the norms of allocation or distribution by "stealing" water or depriving others of the share of water assigned to them by the community, he is subject to punishment. A penalty is imposed depending on the gravity of the offense and according to the norms and values of the system. The irrigator community determines the terms of the penalty. This is intended to prevent an individual from extracting more resources than allocated by the community.

Within FMIS collective decision-making, transparency and accountability are institutionalized. The executive committees of the FMISs usually are accountable to the general assembly of the irrigators association. So, collective decision-making process is institutionalized in FMIS.

(2) Operation and Maintenance Cost of the System

Operation and Maintenance have similar implication like water distribution and allocation. The collective contribution of the community is the basis for the mobilization of the resources from the members of the community. The important point to understand is that the rate of resource mobilization in a FMIS. It is usually found that the contribution for the resource mobilization is made from all members of the beneficiary group. In case of defaulters, the community takes the responsibility of realization of those resources required for O&M the amount required for O&M will be agreed by the collective decision of the members of the irrigation association. The resources would consist of labor, cash and materials.

It is oftentimes misunderstood that the labor contribution for the system is voluntary or cash contribution is voluntary. However, it is not true. It is not voluntary at all. The contribution is the part of obligation of the members towards the system against the benefit and resources to be derived by the members from the system. Hence, the common property resource management like water includes both rights of the members in terms of the water right as well as the obligations towards the system in order to ensure the continuity of the right over the system.

The O&M cost per hectare in hill, river valley, and Terai systems are different. Hill systems have to mobilize between NRs. 400-NRs, 535/ha as compared to about NRs. 100/ha for river valley systems while Terai systems spend about NRs. 270-572.

In hill irrigation systems, conveying the water from the source to the command area is the aspect of operation and maintenance requiring the greatest effort by the users. The distance from the intake to the command area is usually long, passing through steep, rocky terrain prone to frequent landslides. This requires frequent repair and great amounts of labor each season.

Terai irrigation systems usually have large command areas and use large rivers as their source of irrigation water. Floods in these big rivers wash away the intakes and

require frequent repair to sustain a supply of irrigation water. Hence, in the Terai, maintenance of the intake is the largest component of costs.

River valley systems have lower O&M costs because their command areas are close to the water source and no long conveyance structures are required. The terrain is not difficult and fewer repairs are necessary. The important factor to take into consideration in respect to government subsidy is that there is no government subsidy in O&M of FMIS as against the high level of subsidy in agency managed system. The sustainability of these systems in respect to O&M is not in question.

Two O&M cost tables are given in Annexes, which show the cost of system management and its return to the farmers.

It is made clear that the O&M cost are born by the farmers themselves. Compared to agency managed system, FMIS does not have to provide subsides for FMIS O&M.

(3) WUAs in FMIS as Instrument for Resource Management:

The WUA functioning is important feature of FMIS so it is important to identify the factors contributing for effective Water Users Associations in FMIS in Nepal. Following factors are the general observations among FMIS Water User Association. These factors make WUA as an effective instrument for resource management

1. Wider participation of the members of the system and equal distribution of stake among head, middle and tail end farmers make the organization strong.

2. Mutual dependence between head and tail farmers due to difficulty of water acquisition or resource mobilization make the farmers respect each other. In such system, benefit would be equally distributed. This feature makes the WUA to stay together.

3. Transparency of irrigation related activities are important. This takes place in the annual general assembly meeting of the WUA. During this time, rules and regulations and statement of income and expenditures would be discussed. The elected members of the WUA would be accountable to the general assembly. The participation in the general assembly would make the members know about the system. Under such system, water rights are made transparent.

4. Resource mobilization is one of the major activities of the WUA. Resource mobilization based on equality is important. Cash, kind or labors are to be recorded properly. It should be transparent and account is open to all members of the system for inspection.

5. Water would be considered as the community resource so the rules for water distribution is agreed by all members. Decision for water distribution is to be made collectively and enforced by the committee. There are provisions of punishment for not complying the water distribution rules. These provisions make the WUA work and be effective.

6. Water right is usually specified and it is linked with the obligations and resource mobilization.

7. The legitimate executive committee formed on the basis of the voice of the member farmers would be effective one. It can act on behalf of the assembly of WUA. This gives room for wider representation of the farmers in the executive committee.

8. The general assembly would be effective one. It meets at least two times a year. Overall rules and regulations are to be passed by this assembly. Each year, it reviews the situation and comes out appropriate rules and regulations for the management of the irrigation system.

9. The executive committee should be accountable to the general body.

These are the general features of effective WUA. However, WUA are influenced by quantity of water availability, water acquisition procedure, and water right and distribution system. In most of the FMIS, water is taken as community resource and allocation and distribution of water would be done by the collective decision of the irrigator's community. The defaulters would be punished by the collective decision of the community.

His Majesty's Government of Nepal has been providing assistance to FMIS for physical rehabilitation along with support to institutional capacity development. In rehabilitation of FMIS, physical infrastructure took priority over the institutional capacity development. It is often considered the physical improvement is separate from institutional capacity development. As the result of it, dysfunctional organizations have surfaced resulting adverse impact on resource allocation and distribution, resource mobilization and agriculture productivity. Following factors have contributed for the ineffectiveness of WUA for collective activities.

1. External elements deciding to distribute the community resources to the members of the outside community would cause dysfunctional WUA. When the system is extended to include new members during rehabilitation with out proper consent and consultation, the previous members of WUA would tend to be uncooperative. Hence, WUA would be owned by only one section. This often happens when larger new area is attempted to be included in the rehabilitation of the system in order to reduce the so-called cost of investment per unit of land during assistance to FMIS from the government.

2. When water right issue among the members and of the system is not properly analyzed during rehabilitation, the WUA gets ineffective.

3. When ready made rules and regulations are given to the WUA s from outside for them to use, they would not match with the social fabric and norms of the society. This will cause the dysfunction of the WUA. Hence, the rules and regulations are to be developed by the concerned WUAs. Each irrigation system is different so rules and regulations have to match those differences and values of the community. Ignorance of this factor results into ineffective WUAs.

4. Development of trust among the members of the WUA is important. It does not usually allow evolving the trust among the members of the WUA due to time constraint to complete physical target. Membership criteria are important. Resource sharing is going to take place among themselves. If membership is not clear, then trust among the members erodes.

FMIS AT THE CROSSROAD

FMIS is now at the crossroad. There are many challenges to FMIS. They are the challenges of design, of construction materials due to the depletion of the local construction materials, competition on the use of water, stagnated economic development, new legislation either ignored the existence of FMIS or attempt is made to bring these systems under the control of local administration ignoring the need for the development of polycentric system to strengthen the democratic values at the grassroots level and process of assistance by the government to FMIS.

1. ***Construction and Repair Materials***: These irrigation systems require repair and maintenance regularly. Previously, the repair materials would be used from the forest products. Depletion of forest resources and unavailability of these local materials, the farmers have to depend on imported materials like gabion wire and other construction materials. This condition has made these systems dependent on external resources and government assistance program.

2. ***The Assistance to FMIS:*** The assistance funds to FMIS from loan and donors were channeled through the government. Hence, those autonomously managing systems are brought under the influence of the government. The trend of the dependency has increased resulting into the depletion of the initiative of the local community to manage their natural resources like water and land. Similarly, the depletion of the local construction materials for maintenance of the FMIS, new construction materials like cement, gabion wire replaced the local materials. The government distributes these materials so FMIS's dependency has increased.

3. ***Competitive use of Water:*** Competitive use of water and privatization of small-scale hydropower development have put pressure on FMIS. Water source is the same for irrigation, drinking water and hydropower development. Previously, irrigation alone was monopolizing the use of water but it has changed and put pressure on FMIS. Gradually, share of water in irrigation and agriculture sector is changing.

4. ***Subsistence Economy***: Due to stagnated economic development for long period of time, the return from agriculture has not been significant so the youths of the rural area migrated to urban area and other countries in search of job. The maintenance of FMIS is basically labor-intensive one. The unavailability of youth muscle power in the rural area has impact on the management of FMIS in Nepal. This situation has brought changes in the community control over resource management.

5. ***Introduction of centralized water control system:*** The edit of Ram Saha declared that the irrigation management is the responsibility of the community. It also mentioned that the conflict on the use of drinking water is to be settled mutually within the community. Hence, water is considered as "community resource" to be managed and maintained through the collective decision of the community. The extraction, allocation, distribution are to be collectively decided by the community. A number of legal instruments were promulgated with long term impact on the community resource management. "The Water Resource Act,1992", specifies that "Water" is state resources so the uses of water is to be licensed by the government. It gradually moved from community ownership of resource to state ownership concept. Provision is made that the systems which are candidates for rehabilitation from government resources to have the water users associations of the system registered under District Water Resources Committee provided by Water Resource Act, 1992. Such Water Users Associations (WUAs) got legal status and legal recognition. The other FMIS which did not have rehabilitation fund support are considered not legal. Large numbers of systems fall under this category. Through the rehabilitation program, government created two types of FMIS; those government-assisted systems with so called legal WUA and other systems without legal WUAs.

6. ***Newly formed People's Organization:*** The National Federation of Water Users Associations, which has recently formed in Nepal, has serious problem in identifying membership to the federation. At present the so-called legally recognized WUAs are made the members. Hence large number of WUAs of FMIS are kept outside of the bargaining power of the National Federation of Water Users Associations. Only those systems which received the government assistance and those registered in the government agency became the members so the Federation of the Water Users Association represents only small section of officer oriented water users associations (Irrigation Rules and Regulations,1999. The expected activity of the Federation of the Water Users Association in interacting with state agencies, and donors in terms of natural resource management, keeping clear from the political party influences and advocating a seat at the policy and program dialogues will not be possible to be materialized due to narrow base of its organization. It will not be able to establish itself as people's organization for natural resource management.

7. ***New Legislation:*** As the Water Resources Act, 1992, made water resources of Nepal as state property, the Local Government Act, 1999, made the provision that the local irrigation systems are to be managed by the Village Development Committees of the village. This provision directly interferes with the concept of polycentric society and community resource management at the grassroots. The users groups have only superficial existence under the provisions of these legal systems. The Irrigation Regulation, 1999, states that WUA will be registered in District Irrigation Office of the Department of Irrigation. It is also mentioned that the District Irrigation Office with the approval of the Department of Irrigation can dismiss or suspend the WUA. The new irrigation regulation reinforced the establishment of officer-centered WUAs. Such WUAs would not be conducive for community resource management activity. These WUAs would act only as the extension of the Department.

The trend in Nepal shows that Water Users Associations are moving from community based organization to local government directed institution or government induced WUA organization under management transfer program. Following statement on state of water resource management for irrigation is better described in the following statement.

> "As water resources have fallen under centralized and state control through bureaucracies, policies and legal instruments, communities have had to struggle to maintaining their rights, customary, local practices and livelihood". (Ujjawal, Pradhan , 2000. Page 1 *Water for Life*).

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Annex.1: O&M cost/ha at 1996/97 Price[1]

S.N.	Name of the system	O&M cost (NRs)[2]	Conversion at 1996/97[3]	USD=NRs.56.98 in 1996/97
		Terai Systems		
1	Chhattis Mauja	572(97/98)	572	10
2	Pithuwa	741(94/95)	859	15
3	Lothar	430-680(86/87)	143-1808	20-32
4	Rani, Jamara, Kulariya	200(88/89)	426	7.50
5	Karjahi	325(89/90)	627	11
6	Tedi-Gurgi	47(88/89)	100	2
	Average	385-427		
		Hill Systems		
7	Raj Kulo	300-400(86/87)	798-1064	14-19
8	Thulo Kulo	500-700(86/87)	1300-1862	23-33
9	Tallo Kulo	500-700(86/87)	1300-1862	23-33
10	Upallo Kulo	160 (86/87)	425	7.46
11	Sota Kulo	80(86/87)	212	4
12	Satrasaya phant	80(86/87)	212	4
13	Baraha Kulo	100(86/87)	266	5
14	Sange patiyari	600(86/87)	1596	24
15	Phalebas	860(86/87)	2287	40
	Average	482-535		
		River Valley systems		
16	Charhajar	37(86/87)	98	1.50
17	Bhanu Baraha	40(86/87)	106	2
18	Charsaya phant	35(86/87)	93	2
19	Badkapath	50(86/87)	133	2.33
20	Rani Kulo	180(86/87)	478	8.40
21	Gorkhe Kulo	180(86/87)	478	8.40
22	Kwadi Kulo	180(86/87)	478	8.40
	Avrage	100		

Source: Krishna C. Prasad, Suman Sijapati , Prachanda Pradhan, et.al.1998. Irrigation Service Fee in Nepal, Kathmandu: DOI, RTDB and IWMI

[1] Figures are computed on the basis of information given by the farmers plus the records maintained in their books. In Rani, Kulariya and Jamara systems, the O&M figures are only for intake and main canal maintenance (Martin, Ed., 1986). Each system after main canal is to be operated and maintained by the committee of each system. The cost is not included here. The O&M cost of Chhattis Mauja is computed on the basis of information collected by IIMI-Nepal Team, 1998. O&M figure for Pithuwa Irrigation system is adopted from Shukla and Sharma, p.77 and figures from Naresh Pradhan's thesis.

[2] Figures in parenthesis are fiscal years.

[3] Conversion factor is derived from the national account figure from Department of Statistics 1998. Statistical Pocket Book of Nepal, Kathmandu: HMG, National Planning Commission Secretariat.

Annex. 2: O&M Share in Coat of Production and in Net Income (NRs.)

S.N	Name of the System	District	Cost of Production/ha[1]		Total cost of Production /ha (Price of 1995/96)	Conversion [2]into 96/97 price Rs./ha	% of O&M share of cost of production	Net income at 96/97 price Rs/ha	% of O&M cost of net income/ha
			Paddy	Wheat					
1	Raj Kulo	Palpa	16617	12354	28971	31289	3-4	13395	6-8
2	Thulo Kulo	Palpa	16617	12354	28971	31289	4-6	13395	9-13
3	Tallo Kulo	Palpa	16617	12354	28971	31289	4-6	13395	9-13
4	Upallo Kulo	Gulmi	16617	12354	28971	31289	1	13395	3
5	Sota Kulo	Gulmi	16617	12354	28971	31289	0.67	13395	2
6	Satrasaya phant	Tanahu	16188	12354	28542	30825	0.67	11270	2
7	Baraha Kulo	Tanahu	16188	12354	28542	30825	0.86	11270	2
8	Sange patiyani	Tanahu	16188	12354	28542	30825	5.00	11270	14
9	Phalebas	Parbat	16188	12354	28542	30825	7.50	11270	20
10	Char bajar	Tanahu	16188	12354	28542	30825	0.31	11270	0.86
1	Bhanu Baraha	Tanahu	16188	12354	28542	30825	0.34	11270	0.94
12	Charsaya phant	Tanahu	16188	12354	28542	30825	0.30	11270	0.82
13	Badkapath	Dang	12260	11120	23380	30825	0.43	7280	2
14	Rani Kulo	Pyuthan	12260	10378	22638	25250	2.00	6210	8
15	Gorkhe Kulo	Pyuthan	12260	10378	22638	24449	2.00	6210	8
16	Kwadi Kulo	Pyuthan	12260	11120	22638	24449	2.00	6210	8
17	Chhattis Mauja	Rupandehi	14146	12514	25266	24449	2.3	7280	7
18	Pithuwa	Chitwan	15209	12514	27723	29950	3.00	10472	8
19	Lothar	Chitwan	15209	8459	27723	29950	3.00	10472	1-17
20	Rani, Jamara, Kulariya	Kailali	12768	11120	21227	22925	2.00	9430	5
21	Karjahi	Dang	12260	8459	23380	25250	2.50	7280	9
22	Tedi-Gurgi	Kailali	12768		21227	22925	0.43	9430	1

Source: Krishna C. Prasad, Suman Sijapati , Prachanda Pradhan, et.al.1998. Irrigation Service Fee in Nepal, Kathmandu: DOI, RTDB and IWMI

[1] Cost of production of paddy and wheat is derived from DOA. 1996. Cost of production of cereal crops (Paddy, Maize, and Wheat) in Nepal, Kathmandu; DOA, Economic Analysis and Statistics Division.

[2] Inflation correction factor is given in the Annex.3.

Anex.3. Inflation Correction Factor

Year	Factor
1996/97	**1.00**
1995/96	**1.08**
1995/94	**1.16**
1994/93	**1.24**
1993/92	**1.34**
1992/91	**1.48**
1991/90	**1.76**
1989/90	**1.93**
1988/89	**2.13**
1987/88	**2.38**
1986/87	**2.66**
1985/86	**2.99**