

DEVELOPMENT OF THE WATER TRADING MARKET IN AUSTRALIA: TEACHINGS TO JAPAN

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Abstract

The new approaches to water resources management that have replaced dam construction have been investigated after the 1980s in the world. Reflecting on the conventional dam development policy having brought about the disruption of ecosystem and serious government deficits, especially this being applied to Japan, there is a new approach that is known as the “bottom-up” approach. As some of the concrete results of this new approach, we can point to “integrated water resource (or catchment) management” (IWRM or ICM) and “water trading market” being used as an incentive mechanism.

Water trading is the most excellent re-distribution system for water at present in the stage to which the water resource development based on dams (I name this type of water development system as “New Deal”-type approach.) has completed the adjustment of fundamental infrastructures and marginal cost of new water resources development came to invite government deficits and environmental destructions. In order to show this, the dam construction policy and water trading market were compared and analyzed theoretically.

Next, ICM is a new management system based on the “bottom-up” approach aiming to integrate ecosystem preservation and economic development.

Both systems were mutually related through approval process of water dealings, and it was shown clearly that water trading serves as one component part of ICM, especially in Australia.

Australia introduced these two systems promptly and has developed them even into a world's largest scale today. We can point out the development factors which brought about such a big change in the field of water trading as follows.

(1) Introduction of the CAP system

- (2) Neo-liberal reform to "Big Government", and "Corporatization" of public services
- (3) Introduction and improvement of experience of the international market-based management techniques
- (4) Peculiarity of the irrigation agriculture of Australia
- (5) Powerful support as one of the national competition policy by Governments.

The experience of Australia is teaching us that the new water resources management approach that does not depend on dams can be feasible and realistic by both the introduction of ICM and the foundation of water trading market. Furthermore, if this "bottom-up" approach (that is, market-based and decentralized approach) can be established and extended into Japan, a "too big government" for economic growth and the bureaucratic rigidity in Japan will be rationalized to some extent, and a new possibility and vitality could be inspired into Japanese society.

Keywords: Water Trading Market, Integrated Water Resource Management, Integrated Catchment Management, Water Demand Management, Water Policy Reform, Water Resource Economics

Introduction

There is an increasing interest in new approaches or techniques to water resources management that have replaced dam construction after the 1980s in the world. Reflecting on the conventional dam development policy having brought about the disruption of ecosystem and serious government deficits, especially this being applied to Japan, there is a new approach that is known as the “bottom-up” approach. This stresses the importance of "public participation, collaboration with community and government, and decentralization of authorized powers", and includes the recognition of environmental capacity and the principle of ecological sustainability. As some of the concrete results of this new approach, we can point to “integrated water resource (or catchment) management” (IWRM or ICM) and “water trading market” being used as an incentive mechanism. Now, the water trading market is performed in the United States, the Netherlands, Brazil, Switzerland, Chile, Spain and Australia, and is developing increasingly in developing countries including China and Tanzania. Among them, the water trading market in Australia serves as the greatest scale in the world.

However, the water resources management by dam construction of Australia had been continued like Japan up to the beginning of the 80s.

So, we would like to investigate about how such change has arisen, what kind of factors caused this change, how ecosystem preservation relates to water trading market, and what Japan should learn from the experiences of Australia.

Chapter 1 Dam Construction Policy vs. Water Trading Market: a theoretical analysis

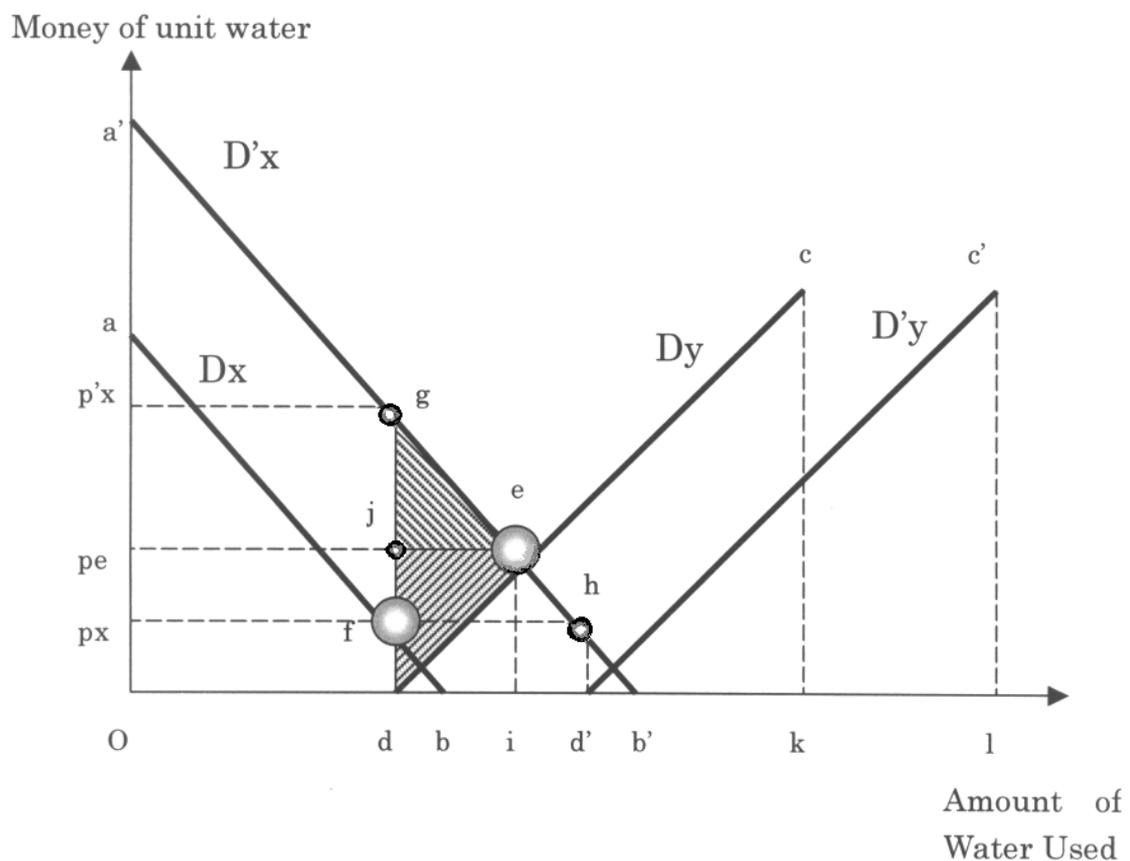
Assignment of water has been performed between the water suppliers of cities for residents, industries, and irrigation farmers by central government after the era of “New Deal”. So, we call this “top-down” (or direct regulation) approach controlled by “big government” from 1930s to 80s as “New Deal”-type approach or “big government” approach. In this approach, each water demand has been secured by the assignment of their water rights which had been created by new dam construction except traditional water rights. However, water demand changes with urbanization or industrialization rather than is eternal. When new water demand was predicted to exceed its total volume of water rights, it has been usually performed by new dam construction to fill this gap in “New Deal”-type approach. However, before planning new dam construction, the water resource managers should have taken the possibility of both of re-distribution of water rights and managing water demand into

consideration.

After the 80s, the new approaches of water resources management that can respond to such a request of “small government” and “ecological sustainability” are investigated and developed in the world, as already mentioned above. As some of the concrete results of new approach that can call the “bottom-up” approach, we can point to “integrated water resource (or catchment) management” (IWRM or ICM) and “water trading market”. Although these two techniques/systems are related mutually deeply, water trading market is taken up at first and IWRM (or ICM) is taken up in Chapter 4.

One of the new techniques of water management is to introduce a new property right called water right (or water entitlement) which can be uncoupled from land and can be tradable legally, and create a market upon it. (Field, 2001, pp.306-07)

Figure 1 Dam Construction or Water Trading?



We can illustrate the merit of water trading contrasted with dam construction policy using Figure 1 as follows.

Let denote x as water suppliers for residents and industry (we call x as urban user for simplicity) and y as irrigation farmers. On a vertical axis, the amount of money of unit water is measured, and the amount of the water used is measured on a horizontal axis. The amount of the water used of x is measured rightward from the Starting Point O, and the amount of the water used of y is measured leftward from

Point k. In the first stage, it is assumed that a total volume of both water rights is shown by Ok , the water rights of Od is assigned to x , and the water rights of dk is assigned to y initially.

Let D_x or ab be an urban user's water demand curve. It is thought that if the prices of tap water or industrial water become high, water demand decreases. Let D_y or cd be a marginal profits curve of irrigation farmers. If the amount of consumption of water increases, the quantity of production will increase, but since it assumes that marginal productivity of water declines, it becomes that marginal profits of water fall. We can regard D_y as water demand curve of irrigation farmers.

The starting equilibrium point is f . The price of urban water at the point f serves as p_x and the urban user's water demand at the point f serves as Od which is equal to the amount of water rights exactly. On the other hand, the water price of irrigation farmers assumes traditionally that it is zero. And also supposing that farmland and water demand could be expandable in the past, irrigation farmers would expand both their cultivated land and water demand to the point d that the marginal profits of water served as zero. So, the amount of water demand (i.e. dk) of irrigation farmers at present is equal exactly to the amount of water rights at the point d . In the equilibrium point f , the urban user's consumer surplus is shown by the area of $afpx$, and the producer's surplus of irrigation farmers is shown by the area of cdk .

Now, let start our analysis from equilibrium point f and suppose that urban user's water demand increased. This situation can be illustrated by the rightward shift of water demand curve, D_x , from ab (or D_x) to $a'b'$ (or D'_x). When the urban user's amount of water rights keeps constant, and no measures are taken at this time, the price of urban water will rise to p'_x . Probably such a rapid and great rise of urban water price will do fatal damage to the living of city residents or industrial activities. Then, although the water administrator has to take some measures, there are two options in that case.

The first one is new dam construction policy.

In order to maintain the price of urban water at the almost same level as before, and to fulfill urban users' water demand and also not to spoil the water rights of irrigation farmers, only fh of water supply should be increased. For this purpose, it will become possible if the water rights of dd' , i.e. kl , is created by construction of new dam. A new equilibrium point including dam construction is shown by Point h . The consumer surplus of the urban user at this point is shown by the area of $a'hpx$, and the producer's surplus of irrigation farmers is shown by the area of $c'd'l$. If the case of the equilibrium point f is compared with the case of the equilibrium point h , since it holds $afpx + cdk < a'hpx + c'd'l$, i.e. $afpx < a'hpx$, social welfare will increase only the area of trapezoid- $a'hfa$ clearly. However, expense of dam construction cannot be disregarded and also various external cost occurs by disruption of the ecosystem. If these dam construction costs are set to G and external cost is set to EC , and if it holds $\text{trapezoid-}a'hfa < G$, a government deficit will occur, and if it holds $\text{trapezoid-}a'hfa - G < EC$, environmental aggravation will arise.

The second one is a creation of water trading market.

Suppose that water right was defined as one of the private property rights by a certain legal system change and the trading became possible legally by it. And, if the water (or water rights) of d_i is sold off from irrigation farmers to the urban water supplier at proper price, both water users can fulfill their water demand without any dam construction.

First, when water price keeps constant at p_x , urban users' water demand serves as O_d , and a water shortage of i_d arises. However, water demand is not an object which is not manageable. We can decrease the amount of urban water demand by reuse of water, saving of water, development of new water-saving technology, use of rain water etc. Furthermore, when urban water demand cannot be saved any longer, and if water price can be raised from the Point p_x to the point p_e without causing any social problems, urban water demand can be suppressed within the range of water rights (i.e. O_i) of urban users by raising the price of water. Probably, it needs some social consideration, such as unchanged charge or no charge, for people who cannot afford to buy water required for a minimum life, since raising of water charge has great influence to the poor and needy.

Second, only d_i of water (or water rights) decreases from d_k of the former amount of water rights for irrigation farmers. Their quantity of production is reduced, and the profits which were able to be gained originally are reduced, and that size of negative economic effect is shown in the area of $e d_i$ by this water trading. Therefore, if there is an increase in the income which can exceed the area of a $e d_i$ in exchange for selling off their water of d_i , this water trading become reasonable and fruitful from the viewpoint of irrigation farmers. What should the irrigation farmers do to get a merit? It is clearly to set up the selling price of water more highly. However, if the selling price of water is set too high, water does not sell. Therefore, the price from which both sides can get profits also in a buyer and a seller is p_e . If a equilibrium water price sets to p_e , the seller's merit of $p_e \times d_i - e d_i = e j d$ belongs to irrigation farmers. On the other hand, while the total amount of marginal WTP (i.e. willingness to pay) becomes equal to trapezoid- $g d i e$ for urban suppliers, an actual purchase amount of money is $p_e \times d_i$, so the consumer surplus of a $g j e$ belongs to urban water suppliers.

That is, the new equilibrium point e which can be attained through water rights market can make a producer's surplus of $j d e$ and a consumer surplus of $g j e$, and the social surplus of $g d e$ can be made to increase totally by selling off the water of d_i to urban water suppliers at a price p_e from irrigation farmers.

Furthermore, it must not be forgotten that this trading does not make the conventional volume of water rights increase entirely. That is, we can fulfill water demand without dam construction, government deficits, and environmental destructions, and also we do not need the regulation or searching costs by Government at all about the determination of the equilibrium point p_e of unit water price. p_e is automatically attained by negotiating so that trading person pursues private profits

and may avoid their disadvantage respectively.

From the above analysis, we can conclude as follows as a whole.

Water trading is the most excellent re-distribution system for water at present in the stage to which the water resource development based on dams has completed the adjustment of fundamental infrastructures and marginal cost of new water supply came to invite government deficits and environmental destructions.

Chapter 2 Brief History of Water Trading Market in Australia

In order to establish the water trading market, considering experience of Australia, some key steps are required as follows.

- (1) Recognize water rights legally as one of the private property rights separated from land.
- (2) Setting the maximum volume of water rights within each basin, and decisions of water distribution plans including ecosystem preservation.
- (3) Institutional design of registration of water rights, approval of dealings and record of dealings.
- (4) Establishment of efficient and robust market by minimizing entry cost, transaction cost and information cost, especially by using Internet.
- (5) Consideration to environmental externalities and externality costs.

In Australia, informal and short-term transfers of water during severe drought were spontaneously performed from the 1940s. (State of Victoria, 2001, p.99) A big change had taken place in the 1980s. In South Australia (SA), water trading was legalized for the first time by revision of Water Resource Act 1976 in 1983. And, water right was established to be a personal property right by SA in 1987 through legal amendment of separation the right of water from land. Therefore, it can be said that water rights trading in the strict meaning of language started in 1987 in Australia. Temporary transfer of water rights (or seasonal allocation trade) started in 1987 in SA and also in the same year started in Victoria (Vic), following amendment of Water Act 1958. In 1989, the amendment of similar law as SA was performed also in Vic (i.e. Water Act 1989), and permanent trade (or water entitlement trade) was accepted legally. Permanent trade started in Vic in 1991, and also interstate trade began by MDBC (Murray-Darling Basin Commission) in 1998 and afterwards. Therefore, temporary trades in the strict meaning of language have experience of 20 years and permanent trades have 16 years of experience in Australia at present.

Furthermore, water reform of Australia had shifted to a new stage in 1994, that is, the federal government had come to pursue water reform powerfully as part of a National Competition Policy. (This reform was called water reform 1994 of COAG, i.e. Council Of Australian Governments)(COAG 1994, COAGWRTF 1995) Using the

powerful subsidy policy called "tranche payments", water reform of COAG was formed the water rights markets in all the States and Territory as shown in Table 1.

In addition, the development of water rights markets are producing a remarkable and dynamic change in the Australian economy, such as promotion of efficient use of water, reduction of the national intervention into the field of water management, promotion of the incentive to water saving technical development, change of the composition of irrigation farm products, the appearance of new occupations, such as a water broker, and so on. Furthermore, water trading in Australia is producing various forms and qualitative development, such as "Internet Trading", future trading, leasing, options, salinity credits trading, drainage rights trading etc.

Table 1 Surface water entitlement characteristics by state or territory

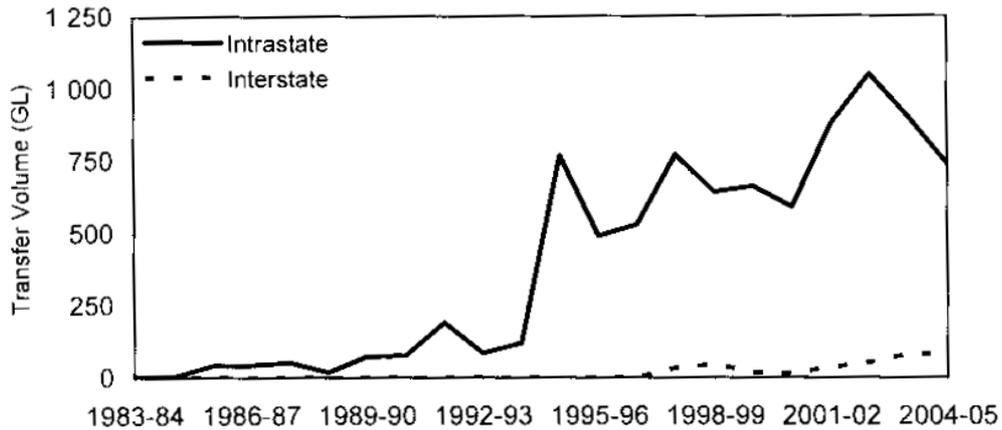
	<i>Volumetric or share</i>	<i>Security</i>	<i>Separation from land</i>	<i>Individual carryover</i>	<i>Governing legislation</i>
NSW	Share	General (55%) High (95–97%)	Separated from land	Allowed	<i>Water Management Act 2000</i>
Vic.	Volumetric	High (96–99%) Sales water (45–75%)	Being separated from land ^d	Not allowed	<i>Water Act 1989</i>
Qld	Volumetric	Medium or High	Being separated from land	Depends on water sharing rules	<i>Water Act 2000, Water Regulation 2002</i>
WA	Volumetric	Various levels of security	Separated from land	Not allowed	<i>Rights in Water and Irrigation Act 1914</i>
SA	Volumetric	High (almost 100%)	Being separated from land	Not allowed	<i>Natural Resources Management Act 2004</i>
Tas.	Volumetric	80%	Separated from land	Not allowed	<i>Water Management Act 1999</i>
NT	Volumetric	High	Separated from land ^g	Not allowed	<i>Northern Territory Water Act 2004</i>

(Source) Productivity Commission, 2006, p.274.

The water trading market in Australia serves as the greatest scale in the world, and is proud of the number of times of dealings of about 13,000 deals/year, and the amount of money for dealings of A\$500 million/year or more at present. (These figures are based on the interview to Mr. Tom Rooney, managing director of Waterfind Pty Ltd, which carried out by the author on September 6, 2006.)

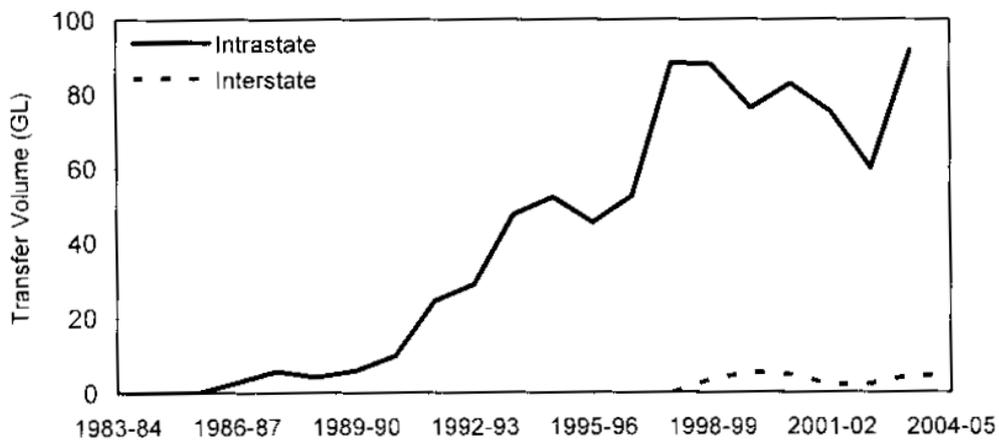
Because of the restriction of width of paper, only transfer volume in the southern Murray-Darling Basin of seasonal allocation trade and of water entitlement trade is introduced to Figure 2. The data of transition of the price of water trading etc. is omitted. Refer to the report of Productivity Commission and Victorian Government for more details.

Figure 2.1 Seasonal allocation trade in the southern Murray–Darling Basin



Data source: MDBC, pers. comm., 26 May 2006.

Figure 2.2 Water entitlement trade in the southern Murray–Darling Basin



Data source: MDBC, pers. comm., 26 May 2006.

(Source) Productivity Commission, 2006, p.277.

However, as for the percentage of the rate that the amount of water gained by water trading occupies to the whole amount of the water used, I would like to introduce the following report of Victorian Government.

Permanent transfers --- are now running at just under 25,000 ML each year. That is nearly 1% of the total volume of water rights and licenses.

Temporary transfers pottered along at about 25,000 ML a year for several years, until 1994/95, when suddenly the volume ballooned to over 200,000 ML. Since then, trade has stayed up at between 100,000 and 250,000 ML each year, which represents 3% to 8% of total water use. (State of Victoria, 2001, p.12)

Therefore, in the State of Victoria, it says roughly that the amount of water gained by water trading forms about 10% of total water use. (ML means megalitres as used in the above quotation and therefore 1 ML is equal to 1000 tons. 1GL is equal to 1000 ML.)

We can summarize the feature of the water trading market of Australia to the following three points.

(1) Instead of the centralized and water supply management by using of dam construction, a new demand oriented and market-based management technique for water resource, such as water rights trading, is challenged and developed.

(2) The water trading market is positioned as part of integrated catchment management (ICM), and consideration to environmental externalities is performed powerfully by using public participation. (Refer to Chapter 4 for details.)

(3)The introduction of the water trading market has the intention of making improvements not only in the ecosystem preservation but also in the global competitiveness of industries including agriculture.

Chapter 3 Development Factors of the Water Trading Market in Australia

The factors into which water trading developed in Australia are arranged briefly below.

- (1) Introduction of the CAP system in 1997 in MD basin: In 1995, Murray-Darling Basin Ministerial Council (MDBMC) introduced the measure of postponing the further diversions from the Basin. In 1997, this measure was perpetuated as CAP system. The primary objectives of the CAP are to maintain and where appropriate improve existing flow regimes, to protect and enhance the riverine environment and to achieve sustainable consumptive use by developing and managing Basin water resources to meet ecological, commercial and social needs. (HLSGOW 1999; Tisdell et al., 2002, p.45). According to this CAP, people recognized that river had environmental capacity and a maximum quantity of river water intake was limited. And the recognition with difficult increase in the water supply by dam construction

had spread, and the concern about efficient use of water and water trading increased at a stretch. (See Figure 2.1 and 2.2.)

- (2) Neo-liberal reform to "Big Government", and "Corporatization" of public services: The water resource development system based on conventional dam policy had caused not only environmental destructions but also various system fatigue such as generating of too much national intervention costs, government deficits, price cartel and collusion, etc. in the world. In Australia, this situation in the meantime is described as follows by Smith (2003).

In these three decades (i.e. 1950s, 1960s and 1970s), 75 per cent of the current storage volume was completed, if we include the 1980s the proportion rises to nearly 90 per cent, although many of the 1980s dams were approved and under construction in the 1970s. The storage capacity of dams completed during the 1950s alone, equaled the volumes of all dams built before that date. Mega and multi-purpose schemes were the vogue. --- This post-war period of unprecedented expansion was aided by further improvements in engineering techniques and distinguished by the injection of comparatively massive sums of Commonwealth financial assistance, a factor that was not present prior to 1945. There is little doubt that pork-barrelling played a major part in the frenzy of water resource activity. It is not serendipity that the mega-projects each involve a different State! (Smith, 2003, p.59) --- Costs of the schemes and prices charged for water were largely ignored and no credence was given to the option of reducing demand by more efficient use of water. --- The seeds of change were beginning to emerge in the early 1980s, however they were fanned by a mild zephyr rather than a strong wind. (op. cit., p.60) --- The powerful statutory bodies that controlled urban and rural water at State level, often with little change since Federation, have all undergone massive reorganization, in most cases they have been totally restructured. The effects of economic rationalism and marketization are everywhere apparent. In the mid-1980s it was difficult to name a major water agency that was not headed by an engineer, now it is difficult to find one that is. All State water agencies have moved to adopt corporatization. (op. cit., p.61)

- (3) Water trading had been recognized to be the new approach replaced with direct regulation (or "big government") type approach and water supply management approach. In the field of Environmental Economics or Resource Economics, market for "transferable discharge permits" and market for water rights (i.e. water trading market) being used as an incentive mechanism have been investigated after the famous Coase's Theorem in 1960. (See Field, 1997, Chapter 13.)
- (3) Introduction and improvement of the experiences of the international water

trading markets: The experiments of the market-based management techniques came to be conducted globally, and the trial of water trading market had started from the early 1960s in the Northern Colorado, USA. (Field, 2001, p.311). Australia studied to such international experiences, and it was developed and has improved further so that the situation of Australia might be suited.

- (4) Peculiarity of the irrigation agriculture of Australia: Based on large-scale infrastructure investment by Government, such as dam construction and irrigation equipments, irrigation agriculture of Australia had been performed by individual farmers who had settled mainly at the postwar period. They used vast farmland freely, had high competitive power, and had developed commercial agriculture.

Therefore, they were able to respond individually and comparatively easily to various changes of the economic environment which surrounded the agriculture of Australia, and diversification of water demand was realized. If water supply is restrained under the diversification of such water demand, the incentive that they would like to exchange seasonal surplus water and the surplus water generated by conversion of crops for each other will occur easily. On the other hand, in Japan, since the use of water resources and crop management tends to be performed for each farm village community, there is a situation that neither conversion of individual crops nor diversification of water demand takes place easily.

- (5) Powerful support as a national competition policy by Governments: Each State Government has been made to promote spread and reform of a water rights trading market through the powerful federal subsidy system called “tranche” in 1994 and afterwards.

Chapter 4 Water Trading Market and Ecosystem Preservation: Integrated Water Resource Management

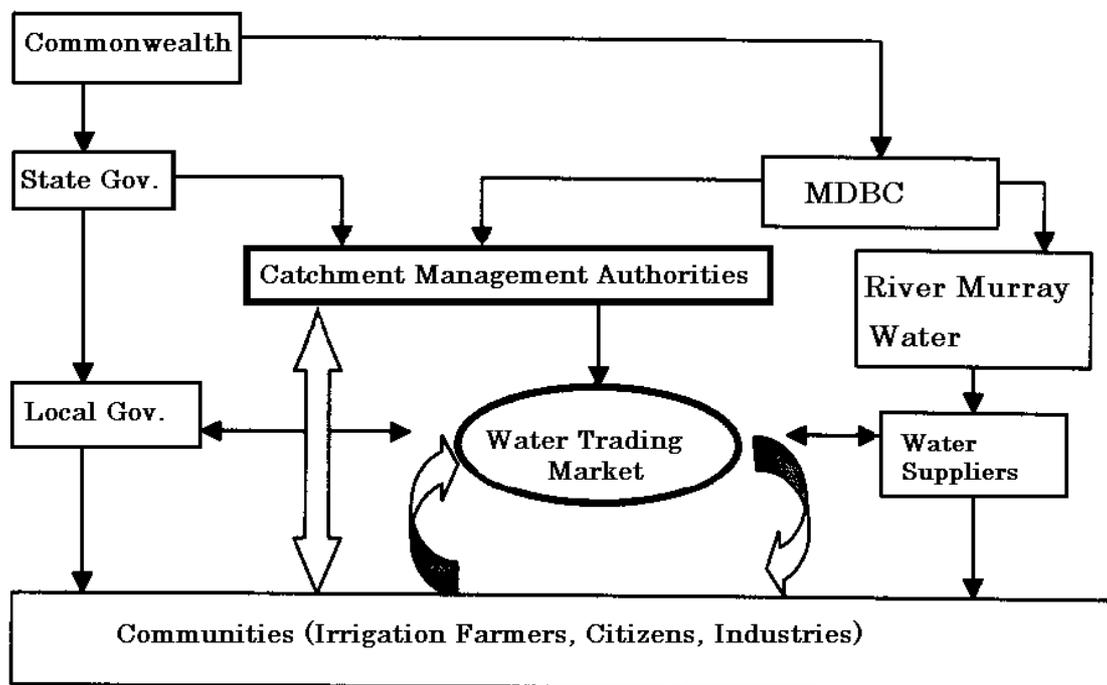
The foundation of the water trading market in Australia does not necessarily aim at only decreasing dam construction, reducing government deficits, and promoting the global competitiveness of industry. The most important role is having connected this mechanism to the purpose of environmental preservation or ecosystem preservation, or if it may say so, the minimization of environmental externalities.

About this point, Australia have developed new comprehensive management framework called “Integrative Catchment Management (ICM)” or “Integrated Water Resource Management (IWRM)”. ICM is the terminology expressing new approach and new philosophy about ecosystem management and natural resources management.

That is, it is based on recognition that the former development-oriented decision-making system (i.e. “New Deal”-type system) exceeded the “environmental capacity” and invited the “ecosystem crisis” repeatedly, and by collaboration and partnership of the government and the communities, it decides upon the concrete Catchment Plan (CP), and tries to aim at integration of economic development and environmental preservation under the creation of new and formal management mechanism. (For detail on the concept of ICM, refer to Ewing, 2003, p.393)

This new and formal management mechanism is called CMAs (Catchment Management Authorities). (See Figure 3)

Figure 3 Catchment Management Authorities and Water Trading Market



This new mechanism was firstly introduced by establishment of Catchment and Land Protection Act of Victoria in 1994, and established a new independent executive organization, which can bear ICM and is coexisting with a former type of vertical administrative management mechanism. Furthermore, Murray-Darling Basin Commission (MDBC) covering four States of Australia became a promoting organization of ICM for the whole basin while it incorporated the conventional dam development section and separated it from the main body of the organization in 1998. This incorporated institution is now called River Murray Water. The MDBC released “Integrated Catchment Management Framework” in 1999, which is called as “the largest integrated catchment program in the world”. (Crabb, 2003, p.244) Moreover, Catchment Management Authorities Act was enacted also in the State of NSW in 2003. Now, the same measure is introduced in Vic, NSW, SA, Qld, WA, and MD Basin.

The relation of water trading and ICM appears in the approval processes of

permission of water rights trading. For example, purchasing some water means that water is lost from a certain area depending on a case. Therefore, water trades should be forbidden (or restricted) when net trade out of a defined irrigation area affects its ecosystem and/or other irrigation farmers' activities. That is, in Australia, another management system with the authority to judge which water dealings should be permitted have to exist under the "Catchment Plan", which is made for every area under the public participation and defines the maximum of the amount of water in which it can trade at every year. The management system of another is exactly ICM. Therefore, it can be said that water trading market is one component part of ICM in Australia. For example, the following "2% rule" is imposed in the case of State of Victoria.

The regulations allow the seller's authority to refuse a trade if it would mean that net trade out of a defined irrigation area in any year starting 1 July, exceeded 2% of the water rights in that area. (State of Victoria, 2001, p.44)

For further details of "2% rule", refer to State of Victoria, 2001, pp.44-45.

I can give another example about the relation between the water trading market and ICM. One of the purposes of introduction of Water Management Act 2000 of NSW was explained in the Technical Report (Tisdell et al., 2002) quoting White Paper (NSW DLWC 1999) of NSW as follows.

The proposed Water Management Act will make provision for the sharing of water resources between consumptive users and natural systems. For environmental water, the proposed Act will provide for the determination of environmental flow strategies and water for groundwater dependent ecosystems. Environmental health water and targeted environmental water will not be available for trading. --- Rivers/aquifers will be classified to prioritize action according to their level of health/conservation value. The proposed Water Management Act will provide mechanisms for defining and managing extractable limits for water. (Tisdell et al., 2002, pp.49-51)

In NSW, in order to perform this purpose, a hierarchical management system called "Water Management Plan" and "Implementation Plans" for judging the water dealings was introduced in 2000. And these plans were used in order to check each water dealings from viewpoints of the quantity of water, its charge, drainage conditions, area specific conditions and so on. (Tisdell et al., 2002, p.49)

The water trading market has also produced a new possibility to environmental preservation. Let's suppose that a certain environmental organization wants to supply some water to a certain marsh and to protect the ecosystem there. Even if the environmental NGO requires a preservation measure of the government, supposing the government does not have financial resources, an environmental NGO appeals for contribution to citizens, will inject the fund into a water rights market, will purchase fixed water rights, and will be able to supply environment. Although such a trial is not necessarily generally performed in Australia, it can be said that a new possibility was opened by introduction of the water rights market.

Some irrigators are opposed to non-irrigators purchasing rural water because freeing water trade to include all potential market participants will result in substantial increases in water prices, which could threaten the viability of irrigated agriculture in some areas. (Productivity Commission, 2006, p.77) The Victorian Department of Sustainability and the Environment is described as follows about this problem:

There is concern in the irrigation community that non-irrigators could buy up much of the water and drive up its price. The Government believes this risk is more imagined than real. No water will be available to buy unless irrigators choose to sell. In the long-term, the price of water will be based on the value people generate from actually using it. (DSE, 2004, p.69)

And also the Productivity Commission Report has quoted the next description:

Dwyer et al. (2005) found impacts on regional gross product from allowing rural and urban sectors to trade water in south-east Australia under circumstances of reduced water availability in urban areas were generally small. In the full trade scenario (which allows unrestricted water trade between regions that could be connected with some infrastructure development --- Melbourne, Adelaide, Canberra, rural regions in the southern Murray-Darling Basin, and Gippsland), the reduction in gross regional product from a 10 per cent reduction in urban and rural water supply was 0.23 per cent for south-east mainland Australia, with no region showing losses greater than 1.52 per cent. (Productivity Commission, 2006, p.78)

Another concern is the entrance of 'speculators' or 'water barons' into the market, and the fear that they could cause the subsequent inflation of entitlement price. On this issue, the ACCC (Australian Competition and Consumer Commission) noted:

--- there is no evidence to suggest that this form of conduct [asserting market power], if possible, is more likely from non landholders or non water users. Limiting the water holdings of these parties will not prevent speculation by current landholders/water users. (Productivity Commission, 2006, p.79)

Furthermore, according to my interview to the officers in charge of water trading of three State Governments (WA, SA, Vic) which was carried out in 2006, it became clear that the introduction of water trading market had some financial merit for all Governments. Problems, such as the generation of speculation, or a subsequent inflation of water price, have not occurred. Moreover, irrigation farmers with critical opinion of water trading were interviewed, and although they pointed out that there was a bad influence which water trading has on regional economy, they approved the validity of temporary water trading and, also they themselves used it.

The water resources of Australia are adding severity increasingly for the drought and climate change, and, in what happens to final evaluation of water trading market or ICM, an unpredictable situation will continue. However, integrated catchment management and a water trading market are the important means of new water resources management of Australia, and, probably being a key factor will not

change.

Chapter 5 Conclusion: Lessons for Japan

Although hundreds of cancellations and reexaminations of dam construction projects took place after the River Law revision in 1997 in Japan, the main reason for these changes came not from the recognition of the negative effect exerted on the environment by dam construction but from the need to reduce government deficits. Therefore, if business improves, there is a tendency to persist in dam construction again. Not recognizing that "New Deal"-type system having caused both the government deficits and ecosystem crisis is the greatest reason by which the water resources policy of Japan cannot become free itself from a dam construction policy fundamentally.

In Japan, it is illegal to trade in the water obtained by his/her water rights at present. However, the new management approach which investigated above needs to be introduced in Japan as long as the water resource management depending on dams continues to produce the deteriorations of the ecosystem and water quality, and the government deficits inevitably.

Australia taught that new water resources management for which it does not depend on dams by introduction of ICM and foundation of a water trading market can be feasible and realistic. Probably, various reforms will be required in order to adapt this new approach to the present condition of Japan. I would like to describe the key process for introduction of new management approach into Japan and to consider it as a conclusion.

- (1) Investigating present condition of our ecosystem and setting up a recovery (or ecological) target/plan including the maximum quantity of water intake: The present condition and its transition of an ecosystem should be investigated at each basin in the first place, and the recovery (or ecological) target/plan of an ecosystem should be defined. Furthermore, the ecological plan have to decide the maximum amount of the water resources which environment should exploit, and the water resources which man can exploit.
- (2) Introducing new law for water resource and management: The law must include the following provisions.
 - Foundation of the water rights (or entitlement) as a private property right
 - Foundation of a water trading market
 - Introduction of Integrated Catchmen Management
 - Establishment of an executive management organization such as CMAs and MDBC

--- Furthermore, if possible, financial measures, such as a Catchment (or Basin) tax, are incorporated.

- (3) Decision of a natural resources management plan, and establishing approval process of water trading: A new management organization decides upon natural resources management plan in its controlling area, such as an ecosystem recovery plan, water resource allocation, and forest preservation. Furthermore, each management organization makes a judgment of permission of water trading, or disapproval in the light of its natural resources management plan.
- (4) Construction of supporting system and Catchment Indicators: Central and local Governments support each catchment management organization while offering information and data (Catchment Indicators) required for catchment management suitable for each catchment management organization.

In short, it is important to introduce the new management mechanism that could focus on natural resources management and become independent relatively as a counterpart to the vertical development-oriented administrative mechanism from the viewpoint of public participation and decentralization. And it is important to combine this mechanism with water trading market for water demand management.

The experience of Australia is teaching us that such a new water resource management approach that does not depend on dams can be feasible and realistic by both the introduction of ICM and the foundation of water trading market. Furthermore, if this “bottom-up” approach (that is, market-based and decentralized approach) can be established and extended into Japan, a “too big government” for economic growth and the bureaucratic rigidity in Japan will be rationalized to some extent, and a new possibility and vitality could be inspired into Japanese society.

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