

# Coordinating Policy Initiatives between Governments in the Water Industry

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## Abstract

In this paper the possibilities of negotiating the coordination of water sharing between governments is investigated in general and applied to the individual governments in the Krishna Basin in India. In this basin the water is shared between three rival states, all who need more water and suffer from inter-sectorial competition. Compounding the problem is that the flows of water along the basin are tied up in regulations and rules that were determined many years ago. Improvements to flows could potentially benefit people in all three states. However, the individual governments need to cooperate if this is to occur, something they so far have refused to do so. The question of whether coordination between interdependent markets is worthwhile revolves around individual states deciding between taking a unilateral approach or accepting a multilateral approach to policy settings on water. The model that is presented in this paper attempts to resolve this question from an individual governments' perspective.

The model developed in this paper relies on understanding both the economic and diplomatic imperatives of the individual governments involved. No government is going to act in concert with another if there is no measurable benefit to it from doing so. Consequently, all governments need to gain something from coordinating water policy initiatives. In terms of an economic outcome, any transfer in water between states that arises from coordinating water sharing rules, has the potential to be beneficial to all states. However, a problem arises with some citizens within a state gaining, while others within that same state lose from changing water allocation rules. These outcomes can be shown in terms of a simple economic trade model, and provide the evidence for why individual governments are not keen on trading water or on coordinating policies which change the flows of water between them. For this reason alone it is argued that individual governments will not even enter into a negotiation process over water flows between states. However, such a model is inadequate as it also needs to be recognised that governments do not always conduct intergovernmental relationships with an economic goal in mind. To overcome this limitation, an International Theory perspective is added to the economic trade model. In this model individual governments are assumed to act according to one of three rules. They want to either:

- maintain hegemony between the competing desires of other governments;
- selfishly maximise gains to their own constituents; or
- reform other governments.

It was found that this model, an extended trade model that accounted for the individual motivations of governments, might be useful in bringing the individual governments together to negotiate better water sharing and flow regulations, as it tends not to be as narrow and unrealistic as a simple trade model.

## **1. Introduction**

Difficulties always arise when resources need to be shared. With most resources, markets have been found to be ideal distributors of goods. However, this is not the case for all goods and resources, especially those that are riddled with market failures. Water is one of these resources that are difficult to allocate and distribute (see Davidson 200\*). Government's are justified in intervene in these markets affecting the allocation of water to users, with varying degrees of success. In such markets it is easy to think of governments as supreme entities who control water systems and plan for the future demands. However, what is not talked about much, let alone analysed and observed, is the behaviour of governments competing with one another. This occurs in river basins where there are two or more riparian states, sharing a common resource. Many governments have development plans built on water that they share. To fulfil these plans requires one government negotiating with another for the scarce resource water.

The Krishna River in India runs through three different jurisdictions; the states of Andhra Pradesh (hereafter AP), Maharashtra (hereafter M) and Karnataka (hereafter K). There is a water sharing plan that was implemented in 1969 and was scheduled to be renegotiated in 2004. As the basin is closed, any plans to further develop water resources will have to be negotiated by the three different governments, through a Tribunal. Four features are important in water cooperation between the three states that share the water resource in the Krishna Basin. They are that:

- that they should cooperate in respect of themselves, but not third state markets;
- any cooperation must occur between the water authorities in each state;
- that existing, yet fixed, allocations occur; and
- any cooperation must be deemed to be 'appropriate'.

In other words, for water any cooperative agreement should be formulated on a basis that maximises the returns to each state and it must be undertaken by the water authorities. Further, while the 'appropriateness' of any cooperation is not defined, it can be thought of as being beneficial to each states users of water.

In this paper the possibilities of negotiating the coordination of water sharing in any market are investigated. This cooperative approach by governments is known as "policy coordination". The Krishna basin is (only) used to explore some of the problems in achieving negotiated settlements. The question of whether coordination between interdependent markets is worthwhile revolves around individual states deciding between taking a unilateral approach to policy settings on water (doing their own thing), or a multilateral approach (one of policy coordination). Prior to investigating this issue, policy coordination is defined and some of the work that has been undertaken in this area is reviewed.

## **2. A Definition of Policy Coordination and the Importance of Interdependence in the Process of Policy Coordination**

Policy coordination can be defined as an initiative by two or more governments to effect a joint goal through collective action. If this joint goal is something tangible, such as facilitating an increase in producers' revenue for a commonly traded commodity or resource, then the markets in which policy coordination is being considered must be interdependent. Otherwise, the multilateral actions (those taken by individual governments in conjunction with other governments in each market) will not have an effect on the industry as a whole, above that which would result from acting unilaterally. If it is established that a link exists between two markets, then government initiatives may be undertaken jointly to achieve a common goal. This act would be considered to be an act of policy coordination.

Water is clearly a resource that states have an interdependent relationship with, as it flows from one to the other. However, in the case of water in the Krishna Basin the relationship is not as clear cut as one might imagine. Clearly a downstream state such as AP is dependent on the actions of upstream states such as K and M, to get water, and thus both K and M have a stronger bargaining position. Another complication arises in the relationship between K and M, who it could be argued are not interdependent of one another, as they are both upstream suppliers.

Cooper (1985) suggested that governments can have three responses to the existence of interdependence. First, a country could attempt to disengage itself from an interdependent relationship, for instance, by erecting barriers to trade. Second, a country could formulate new policy measures that are either not subject to the same degree of erosion or that capitalise on the degree of dependence. A final alternative is to make a conscious effort to collaborate and coordinate policy interventions. This last option is gaining credence, especially in the trade and macroeconomic policy environment and is summarised by Feldstien (1987).

In the case of water in the Krishna Basin, all three responses have to some degree been tried. With K erecting the Almatii dam some attempt has been made to unilaterally capture more of the resource. This is a barrier to trade and an attempt to extract itself from the interdependent relationship. The establishment of industries in individual states that use water more efficiently, yet may not be as profitable, are cases of where a government attempts to disengage from an interdependent relationship. Finally, the existing water sharing agreement and the existence of a water tribunal are examples of conscious efforts to cooperate.

International or intergovernmental policy coordination can be thought of as a situation in which alliances are built between countries or governments in order to move from a chaotic situation to one of more organisation and certainty. McLean (1987) drew a parallel between cooperation and anarchy. He suggested that in a situation where there are no rules, anarchy exists. However, the costs faced by individuals in a situation of anarchy will become so great that all participants are motivated to cooperate with one another, in order to gain some common objective. If in a trading situation in which there are no rules on individual governments imposing policies in the market (i.e. anarchy), then there may be circumstances where two or more countries liaise to define rules and

policies which benefit both. Is this what is beginning to occur with the development of the Almatii dam and other state level initiatives?

Cooperative policy coordination has had a long history in the field of politics and is the basis upon which national alliances are built. Olsen and Zeckhauser (1966) presented an economic theory of alliances. They suggested that alliances are one method countries have of achieving a common interest or collective goal. Furthermore, once this collective goal is achieved, it is analogous to a public good, as it has one or both of the following properties. First, every country or state which shares the goal, benefits once it is achieved. Second, the benefits once achieved, are available to other affected countries or states at little or no extra marginal cost. As in the case of a public good, collective goals may not be provided at their optimum level by individual countries. This is especially the case when the group of interested parties is large and the share of total benefits received by individual countries is small. The incentive in this situation is to provide none of the common good.

Yet in the case of the Krishna Basin this would not, (at first) seem to be of great concern. The water in question is only of interest to three states. However, such a view misses two crucial points. First, as inter basin transfers are a possibility, it could be the case that a third party could benefit from a cooperative arrangement. Second, there might be some indirect benefits from the negotiation process that flow on to third parties. For instance, the costs of negotiating an agreement could be high. Once the process involved in gaining an agreement is achieved however, the process might be used in other basins where a similar problem exists, at a much lower negotiation cost. Surely those in the other basin should then compensate those in the Krishna negotiation process.

McCalla and Josling (1985) state that governments acting in concert can:

- provide global goods that are desired by all, but under-produced by individual governments;
- improve resource use and distribution;
- alter the global distribution of income or assets according to an agreed formulae; and
- define appropriate rules for conduct and property rights.

In other words, governments could achieve more with greater efficiency by collaborative action than they can individually. This fact is not hard to reconcile, when viewed in terms of water distribution. Any individual government that aims to reduce flow volatility of water (i.e. flood mitigation), will find the task easier to achieve by acting with other states that have the same aim, than it will on its own. The aim of policy coordination is for two or more governments to design policies that achieve given objectives, cost effectively. As the efficiency of achieving given policy objectives is not assessed in this study, another way of looking at this problem is to assess the increased benefits that may be derived from acting multilaterally rather than unilaterally.

### **3. Previous Evaluations of Policy Coordination**

The early literature on policy coordination is well summarised in the work by Cooper (1985), McCalla and Josling (1985), Buitier and Marston (1985) and Feldstein (1987). More recently Canzoneri, Cumby and Diba (2005) have reviewed the changes that have occurred since those earlier studies in the 1980s. They conclude that since the early 1990s all that has really occurred are extensions into different market structures. The previous evaluations of policy coordination dealt with the cooperative setting of macroeconomic instrument variables (see Nguyen and Hogan 1988). Hamada (1974) analysed the gains from coordinating domestic credit creation policies, in a fixed exchange rate regime in order to optimise the inflation rate and external account balance in two countries. In undertaking this task, he considered three types of behaviour. Either each country acted unilaterally and in ignorance of the other (Cournot-Nash solution), or each country acted unilaterally but with the knowledge of which country was the leader (the Stackelburg-Nash solution), or the two countries cooperated. Hamada concluded that cooperation provided the optimal solution to this situation. Cooper (1985) replicated Hamada's analysis for the situation of a flexible exchange rate regime and arrived at the same conclusion.

Both Hamada and Cooper undertook static analyses, as did Oudiz and Sachs (1984) and Canzoneri and Gray (1985). All found that cooperative arrangements were preferred over non-cooperation. Alternatively, from dynamic analyses of policy coordination, such as those undertaken by Buitier and Maston (1984), Currie and Levine (1985), Ishii, McKibbin and Sachs (1985), Miller and Salmon (1985), Rogoff (1985) and McKibbin, Roubini and Sachs (1987) it has been concluded that the gains from cooperation are negligible. These dynamic analyses recognise the question of 'time-consistency' identified by Kydland and Prescott (1977). If governments cooperated in one period and then reneged in the next period in their dealings with other governments, then the gains from coordination are dissipated. Alternatively, if governments acted in a manner that is credible, then coordination is likely to yield beneficial results (see Levine and Currie 1987).

A number of issues can be derived from these studies. First, it is important to ascertain the type of behaviour the water authorities take to coordination, i.e. 'Are they cooperative or not and will they do so consistently?' In other words, the question of credibility will need to be addressed. Second, it is important to formulate objective functions for all participants, which incorporate the goals each state expects from a cooperative arrangement. These objective functions do not necessarily need to be the same for each state. In this study, it can be assumed that the objective of coordinating policies is to increase producers' revenues in all three states. Finally, given the nature of water resources, it would appear that any cooperative endeavour should be analysed in a dynamic model, as a lengthy lag may occur before the outcome of an agreement is realised and water regulation is a slow process.

### **4. The Justification for Undertaking Policy Coordination**

There are many normative reasons why governments may undertake policy coordination. At a national level governments are justified in intervening in an economy on efficiency grounds in order to correct for various forms of market failure. However, market failure not only exists at a national level, it also has an international dimension to it. The same logic that applies at an intra national level also must exist between states. Thus, it can be thought of as an inter-jurisdictional problem. Examples of market failure on an inter-jurisdictional level are the existence of externalities (notably pollution), ill defined property rights (such as fisheries reserves or water entitlements) and the underproduction of globally desired goods (like food security and stability). Any of these factors may lead to the inefficient use of global resources, which in some cases may be efficient at a national level. To overcome inter-jurisdictional inefficiencies would require some form of policy coordination by affected governments.

In a positive sense there is only one justification for governments undertaking policy coordination; i.e. to achieve more from the act than they lose. Hence, for each individual government contemplating the inter-jurisdictional coordination of policy initiatives, only one question should be asked: 'Are the net benefits from acting in a multilateral fashion greater than those from acting unilaterally?'

The benefits to governments of acting in concert with other governments are derived from three sources. First, individual governments may achieve policy objectives more efficiently by sharing the costs of any measures amongst other nations. Second, by agreeing to a coordinated approach, one country may not be instituting policies to counteract the effects of a policy that has been instituted in another country. Third, policy reform may be more easily achieved in a coordinated framework, than unilaterally. In other words, if water reform is one of the goals of policy coordination, a multilateral approach tends to be less risky and more desirable than a unilateral approach (Cooper 1985).

The justification for policy coordination presented above is limited and presupposes a number of factors. Such an approach does not account for the costs associated with it. The costs of undertaking policy coordination can be large. They are incurred in the costs of negotiating an agreement and in the loss of sovereignty associated with keeping any agreement that has been negotiated. It is further limited in the sense that all the reasons why a government might undertake a multilateral approach to the policy formulation are not addressed. Surely each government would want to include other issues in the negotiation process, or it might just derive utility from being a fair and honest broker in the process. Further, it is assumed that all the benefits and costs of the arrangement can be quantified, while in reality they cannot be. For instance, a government may undertake a coordinated approach to policy setting, which yields no net benefits, in order to establish closer diplomatic relationships with other states. In addition, the rationale for policy coordination presupposes that governments have perfect foresight and can thus adequately gauge the outcomes of the arrangements. Finally, the approach provides little information on who should benefit and how they should be made better off.

Policy coordination is usually undertaken on a wide range of issues affecting a number of industries (if not all of the industries in an economy). As a consequence, one industry

may gain from the arrangement while another loses in the process of gaining greater efficiency in each state. From an individual industry point of view, no agreement would be reached as one partner has the potential to lose. For the arrangement to proceed, the benefits and costs would have to be assessed on a national or state basis, with the potential for gainers to compensate the losers.

Later in this paper, the justification for undertaking policy coordination is developed to ascertain whether such an act should be used in the water markets of K, AP and M. It is assumed that the only objective of the state governments is to enhance water users' gross revenue or net income. In addition, it is assumed that the only coordination being planned by the state government is for water. Both these assumptions are consistent with many of the objectives of each states water policy initiatives. Of interest in this assessment are the impacts (if any) of coordination above those that can be gained from acting unilaterally.

## **5. The Process of Policy Coordination**

In the discussion presented above, the extent to which policy coordination could be undertaken was not addressed. In assessing the extent of policy coordination, questions arise on how the joint setting of policy instrument variables can be achieved to obtain the goal of increased producers' revenue? If these variables are equated, at what level will this occur, i.e. at the lowest or highest current settings, or will they be averaged? Clearly the answer to this question is not as simple as it would appear. The policy instrument variables should be set such that the benefits derived by all participants are both maximised and positive. However, even if this is achieved, the division of the spoils can be a contentious process. Equally contentious is the process of deciding who should bear the costs of a cooperative endeavour. The purpose in this Section is to investigate the rationale underlying why cooperative agreements are difficult and hence expensive to achieve and to present some details on the likely form of a joint policy setting authority.

Runge, von Witzke and Thompson (1989) suggest that the provision of cooperative behaviour is analogous to the provision of a public good, as the results of it in an interdependent market are non-excludable and non-rivalrous. Public goods pose problems of both efficiency and fairness. Public goods are difficult to supply efficiently, because of the problem of 'free riders'. If a policy is implemented in one market that has a beneficial impact on the other market, then the second market could be said to be free riding on the first. In terms of detrimental impacts (especially in the case of two exporting countries) eliminating the policies becomes a question of implementing the reform of these policies (i.e. the public good is the supply of cooperation necessary to reform the policy under investigation). One country may undertake to reform its policies for the benefit of all, while the other free rides.

The process of inter-jurisdictional policy formulation is more difficult than that of national policy, yet it has similar elements to the national approach. Policies must be designed to achieve agreed goals by all participating states. Furthermore, it is necessary to have common rules and actions by which the partners operate, and the monitoring of these actions is essential to the workings of any agreement. Finally, joint financing and

administration is a necessity for success. The method by which policy coordination is arrived at is a complex and time consuming process. Not only do all participants have to perceive the same problems, but they all have to agree on a common solution, resolve the problems of administering and paying for the program and then all strive for its success.

Clearly, achieving all these factors is not easy. As a consequence many attempts at policy coordination have failed. Cooper (1985) suggests there are many reasons for failure. Differences in objectives and/or the ranking of importance of those objectives are a principal reason for failure. Cooper also suggests that differences in the impacts of future events, a lack of trust, a desire by governments to maintain national autonomy and a lack of leadership may all lead to failure in policy cooperation.

A reasonable question that could be posed at this juncture is, 'What will a coordinated water policy making body's structure resemble?' Many of the bodies that currently undertake a policy coordinating role, such as the WTO, are large bureaucracies as many countries are involved and the monitoring role of these organisations is extensive. However, in the case of the Krishna Basin, as each has an established organisational structure, this may not be the case. A more likely model for the coordinating body is one outlined by Patterson (1987), who analysed the functions of the Murray River Commission. This body coordinates the activities of individual governments who share responsibility for managing a common water course. The Murray River Commission had a small bureaucracy that relies on its participants' statutory authorities (in the individual States) to carry out its functions. In essence, a Krishna Basin water coordinating body could function in a similar manner, commissioning the domestic organisations to fulfil its operational requirements. Such a structure may reduce the costs of policy coordination.

## **6. The Process of Negotiating Policy Coordination**

The current body of thought used in economics to explain the action of governments is the Theory of Public Choice. Within this body of theory it is posited that governments are motivated by and act according to the principles of maximising either the interests of the public or by politicians own selfish concerns, thus increasing the support amongst their constituents. While the Theory of Public Choice would appear to be valid in some cases of domestic policy formulation (although the evidence for it is patchy) it has not been tested on international policy coordination issues. If the Theory holds then it could be argued that individual countries would only broker a deal that maximised individual country's benefits.

International Theory may provide a more adequate explanation of the actions of government involved in negotiating international trade agreements. Under International Theory, countries will still negotiate to improve the conditions they face. Wight (1991) hypothesised that governments react with other governments in one of three ways. They will attempt to either:

- maintain hegemony between the competing desires of other governments (known as a rational approach);

- selfishly maximise gains to their own constituents (known as a realistic approach);  
or
- reform other countries (known as the revolutionary approach).

The Uruguay Round of the GATT provided an example of how governments negotiate with other governments from sovereign states that are on an equal footing. The Round was principally negotiated between three different but equal partners: the United States, the European Union and the Cairns group of countries. It could be argued that the United States presented its case from a 'rationalist' point of view, while the European Union and the Cairns group took an approach that was 'realistic' and 'revolutionary', respectively. The European Union had the power to pay its producers' subsidies and realised that the rest of the world could do nothing about it. During the negotiations they tended to be intransigent, not wanting to change their policy stance, as it would not benefit their producers. The United States continually argued for fairness in the debate, retaliating to perceived threats from the European Union while protecting their producers. According to Wight (1991) rationalists desire balance and equilibrium from the process of negotiation and do not necessarily require the most that they could achieve from this process. The Cairns group extolled the virtues of the free market (in a revolutionary manner). Given this, it is surprising that there was an outcome from the negotiation process at all. It can be surmised that the stakes were so large that countries had to strive for a common position in order for all to gain, otherwise all would lose.

Two issues are important from the foregoing discussion. First, countries or states negotiate from different positions and in different manners. They are possibly going to take a rational, realistic or revolutionary approach to the negotiation process. The choice of approach will most possibly be dictated by what the individual countries or states perceive to be in their best interests. Second, they will negotiate to gain something that is in their own interest; otherwise they would withdraw from the procedure.

## **7. A Method of Assessing the Benefits and Costs of Policy Coordination**

The material presented above reveals a number of factors that, if present, may make policy coordination beneficial. However, little is revealed on the method that governments can use to gauge whether they should undertake policy coordination or not. The purpose of this section is to derive a mathematical relationship that would allow a government to make such a decision. This method relies on estimating the impacts that are derived from policy coordination over those derived from acting unilaterally.

For policy coordination to occur all states in the partnership must gain something, otherwise they would not voluntarily agree to cooperate. Assuming that all states attempt to maximise producers' revenue from cooperation, then each individual state will argue for cooperation on two conflicting grounds. First, a state will attempt to reduce or eliminate those policies of other states that have a negative impact upon them. At the same time they will attempt to retain as many of their own policies that have a positive domestic impact, but may have a positive or negative inter-jurisdictional effect. Second,

a state will attempt to interest other states in policies that have a positive effect on it, while trying to minimise the costs it will incur in implementing these measures.

Hence, as a precursor to assessing the gains from policy coordination, the policies that impact on the water sector must be ordered according to the impacts they have on each state. The existing policies can be ordered into those that have either:

- a positive impact on both states; or
- a negative impact on another state.

While policies that have a positive impact on both states are easily coordinated, debate may ensue on sharing the costs of the measures. The latter group of policies which impose costs on other state are more difficult to coordinate, as they involve the sacrifice of a domestic benefit, in order to make foreign state better off. Once the policies have been ordered, the agenda for negotiating which policies should be changed in the process of coordination can be conducted.

Given that a state must gain from policy coordination before it will consider it, the following must hold,

$$B_i > 0 , \quad (1)$$

where  $B_i$  are the net benefits to state  $i$  from coordination and are encapsulated in this study in the form of increased producers' revenues from water use.

In addition it must be the case that for two cooperating states ( $i$  and  $j$ ) the summation of all benefits derived in all states must also be positive, i.e.

$$B_i + B_j > 0 , \quad (2)$$

The net increase in producers' revenue derived by state  $i$  from policy coordination is equal to the combined net effects of domestic and international policy changes, along with the costs of negotiation. In other words, the benefits are equal to,

$$B_i = PD_i - ND_i + PM_i - NM_i - C_i , \quad (3)$$

where  $PD_i$  are the sum of benefits that accrue to state  $i$  that resulted from changes the state had to take to domestic policy measures;

$ND_i$  are the sum of costs that are incurred by state  $i$  that resulted from changes the state had to take to domestic policy measures;

$PM_i$  are the sum of benefits that accrue to state  $i$  that resulted from changes foreign states ( $j$ ) had to take to their domestic policy measures;

$NM_i$  are the sum of costs that are incurred by state  $i$  that resulted from changes foreign states ( $j$ ) had to take to domestic policy measures; and

$C_i$  is the sum of the costs of establishing and maintaining cooperative arrangements.

The magnitude of these impacts will depend on the extent to which the policy measure is employed, the commitment of the participators to the agreement and the extent to which water and the goods produced from water are exported or consumed domestically. In addition, the size of the international impacts will also depend on the strength of the interdependent relationship between the states. The size of the costs will depend on the degree to which policy coordination will be undertaken and the difficulties encountered in achieving an agreement. Hence, it is better to think of the influences in terms of changes, as in the process of negotiation policy variables will be altered which in turn will alter the benefits and costs faced by an individual country.

To determine the extent to which policy coordination will be adopted, a necessary condition for all states is that the net impacts to each state from undertaking policy coordination must exceed the cost of cooperation. This will be the case regardless of how individual states negotiate. Hence, in the case of two states,  $i$  and  $j$ , it is necessary to,

$$\text{Maximise } B_i + B_j , \quad (4)$$

subject to  $B_i > C_i$  and

$$B_j > C_j .$$

If the costs of cooperation are minimised, while the positive impacts are maximised and are greater than the costs, then gains could be made by all participants. However, this situation will be rare as some trade-off will most probably be needed between the negative impacts and the positive effects cooperation has both inter-jurisdictionally and domestically.

Individual states can and do take different approaches to the process of negotiating an agreement. These approaches affect how each country maximises its benefits, which are specified in equation (3). If a state ( $i$ ) takes a 'realistic' approach, it will attempt to maximise the benefits that arise from the process whether they originate domestically or from overseas (i.e.  $PD_i$  and  $PM_j$ ), while minimising the costs (i.e.  $ND_i$ ,  $NM_j$  and  $C_i$ ) and ignoring the effects on other states ( $j$ ). The only exception to this rule may occur when a state provides a benefit to another state (i.e.  $PD_j$ ), in which case a 'realist' may argue for compensation from the state receiving the benefit. If a state ( $i$ ) takes a 'rationalist' approach it will attempt to maximise the benefits that arise from the process for all participants whether they originate domestically or from outside the state (i.e.  $PD_i$ ,  $PD_j$ ,  $PM_i$  and  $PM_j$ ), while minimising all the costs (i.e.  $C_i$ ,  $C_j$ ,  $ND_i$ ,  $ND_j$ ,  $NM_i$  and  $NM_j$ ). It is hard to quantify the actions of 'revolutionaries' in this framework as it depends on their agenda. For instance, the actions of the Cairns Group in GATT were to minimise the

international influence of domestic policy measures. In the framework presented above this would mean minimising  $PM_i$ ,  $PM_j$ ,  $NM_i$  and  $NM$ . It could also be argued that the Cairns Group took it upon itself to educate the rest of the world of the dangers of government intervention, thus affecting all variables in equation (3), including  $C_i$ .

In the case of the Krishna Basin, it can be assumed that the individual states would take a 'realistic' approach to the negotiation process. This assumption is based on the fact that it would appear that the water authorities have similar objectives (to maximise producers' revenues) and do compete with one another.

To maximise equation (4) the variables presented above need to be quantified and a mechanism by which they will be altered must be specified. In the main, most policies in the Krishna Basin have had the objective of increasing the revenues received by producers. In this study, the impacts of policy coordination on producers' revenues can be isolated and measured as some coordination of policy changes is undertaken. Further, given the interest in the impacts of different policy approaches, i.e. coordinated as opposed to unilateral, each policy instrument variable can be altered at the margin. Thus, the results derived from a combined approach to changing policies can be compared directly with those achieved from acting alone and the differences computed.

To apply the model presented above also requires some knowledge of the costs associated with setting up the agreement. Yet, those will not be known with any certainty before the agreement is promulgated. Another way to observe whether cooperation will be undertaken, when the costs of achieving it are not known, is to rearrange equation (3) so that the impacts of any agreement are assessed with the assumption that the costs of achieving it are zero. Consequently, it must be the case that the cost of reaching an agreement must be less than any positive impacts achieved from cooperation, in order for the agreement to be beneficial and therefore undertaken. In other words, the benefits derived from cooperation, above those derived from acting unilaterally, will provide details on the maximum amount each country is willing to pay to promulgate an agreement and still achieve net benefits from it.

The approach outlined above suffers from two significant problems. First, there is the problem of establishing a base simulation run upon which to compare different degrees of policy coordination, as a limited and unspecified degree of coordination is already occurring in setting the policy instruments. Second, if more than one policy is implemented, it is difficult to account for changes in all policies simultaneously. For instance, if two policies are analysed, each having opposite and equal impacts, the result would be that coordination should not take place, as all the benefits cancel one another out and all that is left is the costs of negotiation. If each was analysed separately, then coordination may prove to be beneficial. One solution to both these problems is to analyse each policy intervention separately and in an ordered fashion from the most important to the least important, summing the benefits as the process is undertaken. By doing this, the degree to which coordination occurs can be assessed and included in the analysis on a policy by policy basis. Further, agreeing on the settings of the most important policy (i.e. the most influential policy with the greatest ramifications) first and invoking the rule that they can not be altered during that iteration, would allow for a

beneficial outcome to occur from coordination. Such an approach and its associated rules are believed to be consistent with the process of negotiation.

## 8. Summary

In this paper an attempt was made to describe a method which could be used to assess the outcomes of governments cooperating over sharing scarce water resources. This method has its genesis in the work on international trade, macroeconomic assessments and studies of diplomacy. It was argued that a single government would not cooperate to coordinate water allocations unless it had something to gain from the arrangement. However, those gains could be in areas other than those derived from allocating water. In addition, the negotiation process used by individual governments would have a great bearing on the outcomes from coordinating water policies. In the future this approach will be applied in India, where three separate governments are negotiating over the scarce supplies of the Krishna Basin.

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