

Preamble
to the Discussion Note on
Water Tariff Setting in Maharashtra:
A First Principle Approach

One of the mandates of the Maharashtra Water Resources and Regulatory Authority is to revise and set Tariffs for Bulk water supply. In doing this the authority is expected to take into account the changed nature of the Indian economy as it progresses from low income poor country to a mid-income one. It should also be forward looking and reformist in carrying out such an exercise. Thus, in carrying out this upward revision of the Tariffs and bring about changes in its structure, it ought to rationalize the process with reference to solid economic theoretical concepts as well as the current things within India and elsewhere. Since any and every increase in tariff is necessarily bound to be not very popular, there has to be wide ranging discussions between the stake holders and the authority so that persuasive arguments and discussion with a mature society will find acceptability for bold reform agenda which is in the interest of national development. Ultimately the concerns of viability and sustainability in any project must prevail for it to pass through and be carried out successfully must have the acceptance of the political masters and more importantly the public at large. This is particularly true of India where we believe in the value and virtue of participatory democracy. ***It is with a view to carry out a constructive, open debate and discussion about the tariff revision that this preliminary note is being put out in the public domain.***

A Discussion Note on Water Tariff Setting in Maharashtra: A 'First Principles' Approach¹

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1. Introduction:

Setting of water tariffs or indeed setting of tariffs related to the delivery of any other public utility service is never a purely technical exercise. Whilst there is a huge amount of literature on regulatory pricing backed by theoretical rationale, the ultimate setting has to be a *wisely feasible* rather than a *clever* exercise. It must at once be informed by theory and empirics; learning from the past and elsewhere; must be context dependent and most importantly must pass the muster or filter of political economy of the day. Thus while *on one hand it must push forward towards optimality, it must also very keenly keep an eye on what is feasible and hence doable.*

In this brief note we *do not* get into the micro aspects of the mandate (in its various aspects and components). In particular we desist from number crunching, or statistical exercises. Data availability apart these matters are too involved clearly beyond the pale of a mere economist and fall within the domain of an accountant. The other intricate matters will still remain and will require serious relook at extant methodologies and even the mandate. This latter exercise which is very important will require a team of water experts, geologists, technologists and agricultural scientists not to speak of economists specializing both in policy matters and public finance. *In any case the primary purpose of this note is to clarify some concepts and propose some forward looking tenets that could be discussed and adopted if found acceptable.*

¹ Since this note is in the nature of advisory brief we have not ended with the literature referred to in the process of preparation of the note.

2. Backdrop: The context

The stage of economic development of a country or an economy is an important point of departure in specifying the context for tackling a problem or issue at hand. The practices prevalent in developed countries are normally not suited in the Indian condition. Even within Indian States the practices would tend to differ although none are so far ahead of Maharashtra that will allow us to learn from them. It may be hoped that eventually, there will be some kind of convergence.

In an economy that is developed and prosperous, where poverty has been removed and has little inequality, it would perchance be possible to recognize that water is *not* a pure public good. Realising that Maharashtra (and indeed India) is far from the attributes described above, we perforce will need to treat water as a *quasi-public (merit) good* for some time to come and make substantial adjustments in the pricing of water. *The obvious concerns being affordability due to poverty and inequality as well as the matter of political feasibility due to perceived inability to charge.*

3. Some Relevant Costs Concepts

There is a **centrality** to the concept of costs as a point of reference when it comes to tariff setting. This is simply because one of the considerations in tariff setting has to be the concept of viability of the service delivery. This of course involves trying to cover as much (if not all of the costs involved) ground as possible. To compound the matters, these days, one talks of the crucial and more general concept of sustainability which presents a rather complex set of issues.

One could list a whole variety of cost concepts that are used. For example there are the opportunity costs, real/ nominal costs, replacement costs (which are the costs required to replace an item such as a capital equipment as distinct from historical costs that were incurred at the initial time), economic costs, production costs, accounting costs to name but a few. Underlying some of these are the derived concepts of fixed or sunk costs, variable costs, average costs and marginal costs, again to name some more. These costs in the latter category are calculated derivatives from the most fundamental cost concepts and hence present no difficulty in understanding and hence costs from the latter category are not treated

in this note. Here, we consider and clarify some of the fundamental concepts that are germane to the issues at hand.

The most important cost for the economists is probably the so called **opportunity costs**. This measures the return on the next best forgone alternative. To put it rather simply (and therefore unrealistically), if one uses up 5 litres of water for domestic consumption the opportunity cost is measured as the return on the best alternative (say allocating this water for commercial use) using these 5 litres. This is a generic concept that underlies the concept of optimal utilization of resources. Clearly, this concept whilst important to keep in mind while decision making, cannot be used in the strict sense in our situation since it would lead to – corner solution – i.e., allocation of water to one sector alone. Of course, there is complexity that can be infused even in this example by introducing the concept of social costs (how socially beneficial it is) as against considering purely private costs as seen in actual payments involved which would be on the basis of artificially set prices. This concept would be useful in the present context in working out the cross subsidies as well as proportional allocations (say) between domestic and industrial consumption.

The **production costs** refer only to the cost of production of the underlying product. This means that it does not take into account the costs of distribution/ marketing/ awareness campaigns/ supplying etc. It also does not include explicit costs such as the taxes and subsidies. Thus, in an on-going process, it includes the imputed fixed capital costs (on plant and machinery), the labour costs and the raw material costs as also the costs involved servicing of debt incurred if any in operating and maintaining the plant in optimal working condition. Some would also argue for inclusion of depreciation as well. This sits between the full or total costs and O&M costs of the plant.

O&M costs are the costs that are incurred in the process of operating and maintaining the facility in delivering the product or service under question. This means that we take into account all the costs involved in producing and distributing the product or service under consideration. It should thus cover all the expenses that are incurred in keeping the production-delivery enterprise going. These are largely working/ revenue costs with also the element of debt/ capital services charges. While some

would argue that depreciation costs should also be included in this category but it is moot in actual situations.

The **accounting costs** are as the name suggests costs that are explicitly accounted for and are reflected in the balance sheet and thus include production costs as well as taxes/ subsidies, advertisement costs et al., Clearly, O&M costs are a part of this category. Since externalities that arise in the production and delivery process are expected to be internalize them via taxes or subsidies depending on whether they are positive or negative ones, these are implicitly taken to be included in this category.

The **economic costs** are simply put as the sum of accounting costs and opportunity costs. This is a theoretical construct and not always reported. These are also referred to the reference point by some as those that are to be ideally covered in undertaking the exercise of pricing/ tariff setting. Some add the economic externalities explicitly to this category but we do not think it is necessary for reason stated in the last sentence of the last paragraph. Of course as a corollary, it follows that when externalities are not taken into account, they need to be added here. Indeed, some will point to this concept when talking of full (economic) cost pricing.

These days there is a lot of talk about sustainability concerns in general and sustainable goals in particular. These are a comprehensive set of goals that cover almost all the aspects of holistic economic development. An important component here has to do with ecological/ environmental concerns. Indeed, in the specific case of water there is talk of water foot print and its impact on environment. In case of any developmental project there is some trade off to be worked out between the environmental costs and the benefits in the short and longer term that will accrue due to the development project. The costs, it is argued, must consider life cycle analysis (both the shorter version and the full life cycle) and that in consideration of economic costs the direct and short term costs have to be supplemented by longer term costs and those due to destruction of eco-system services. These are weighty arguments and must be considered at some point. However, we are only now learning to put together acceptable and tested frameworks and computational tool kits to quantify these costs. For developing countries in general and India and Maharashtra in particular, it is safe to say that the while the time to recognize that these costs exist is now, wise counsel would advise that we

may and should defer the actual actions in these matters for some time now. In short, whereas some would argue that full cost pricing would need to cover all these cost considerations for us and here, the time is not yet to induct sustainability costs in our reckoning!

4. Some Practices Elsewhere: (Other countries/ Electricity sector in India)

This is advisedly a very short section. The reason is that whereas one could have documented the various practices that are extant in developing and developed countries, given our situation currently it will be foolhardy to attempt to emulate any of them. At most we can flag them just so that they could be aspirational points that could help us chalk out our long term path/ goals. Similarly whilst electricity regulatory practices are closer to home, they still are more evolved and not of much immediate relevance to us in the present context. To be sure, there is some variability in practices within the Indian States but none are far ahead of Maharashtra to be considered for purposes of emulation so we ignore documenting cases of Indian States.

In cases of most developed countries the underlying principle of full cost pricing is accepted. This covers O&M as well as capital recovery. These countries have shifted from viability to conservation effort (efficient usage). Indeed, in Australia – perhaps unsurprisingly – an upward revision has led to less water being consumed (at least in urban areas) leading to conservation and steps towards sustainability. There have been efforts at institutional reforms including not just PPPs but allowing of private sector in by itself. As a rule of the thumb, while there are a few exemptions based on functional usage, for all others it is cost plus principle so that the need for cross subsidization is met. This is done largely by institutions that are specially set up for this purpose (rate setting and regulatory authorities). This is like our water regulatory authority except that give the developed nature of the economies elsewhere and hence the largely non-existent affordability issue allows the institution to apply market principles with greater ease. There is general acceptability of such principles and credibility of the regulatory authority so that the recommendations of such institutions is followed by the political masters without the fear of adverse political repercussions.

As far as the electricity sector is concerned even in India we are far ahead in reforming the price setting vis-à-vis the water sector. *Ease of measurement through universal metering as also the fact that the perception that electricity is less basic than water especially in developing or poor country like India could also be the reason for this.* Probably it coming to play earlier in time has something to do with it. This gives reason for hope that the water Regulatory Authority will catch up in time.

5. The Contemporary History of Tariffs

Since this is a note being written at the behest of the Water Regulatory Authority in Maharashtra any effort spent on recalling the contemporary history of tariffs that they are themselves – in an earlier *avatar* – been responsible for, would be foolhardy as it would be part of the institutional memory. It would indeed be like carrying coal to Newcastle! We flag this issue to just point out that this is a crucial point of reference in setting tariffs going forward. For this reason alone, it is important that we take cognizance of the contemporary history of tariff structure for water in Maharashtra and note that every term of the Authority has seen some marginal progress (with some new ideas) to reform the tariff system, of course always within the confines of the State mandate. *This is important since too disruptive a change will not pass the muster of political economy filter as clearly such a policy announcement will not be acceptable to the public.* Political decision making abhors sudden large and disruptive changes and incremental changes are the order of the day unless there is an appetite for great amount of risk taking which in India is seen only at the time of crisis. Thus, whilst the regulator must keep an optimal vision in sight in the medium to long term, in the shorter run it must hasten slowly and yet boldly try to push the envelope as far as is possible. Perchance we may be able to take a position that in the NEW INDIA that is emerging with new found growth and confidence (the current temporary phase of a slowdown notwithstanding) it is time to make a quantum break from the past as we reform our practice here. How much we will be able to accomplish will of course depend, as always, on the tenacity and conviction of the Regulatory Authority in pushing the envelope and getting the nod from public and political masters. Which in turn depends on the character and strength of the political leaders.

6. The State Water Policy and Legal mandate

The setting of tariffs and hence the allocation (induced and otherwise) will have to be circumscribed by the tenets laid down by the State's water policy. Here, we briefly flag at some of its salient features.

Perusal of Water Act, water irrigation commission reports, water policy reports, FC recommendations, research studies conducted by Indian institutions as well as some global/ largely multilateral ones, ***it seems clear that the thinking and exhortations contained therein far exceed the actual practice, perhaps as it should be!***

Thus, they almost futuristically, talk of treating water as a private commodity, of letting in private sector in and hence focussing on institutional arrangements rather than focussing on investment requirements going forward. They also talk of nudging the users to wards conservation effort through incentives induced via higher prices. As with many other things they load the regulator with almost a mission impossible, talking of many things that they must be engaged with. At the same time they also expect the regulator to go into minute details of cropping patterns/ technologies used for water delivery (lift irrigation) and seasons while setting the tariffs, not to mention the matters like conservation and nudging every agents and agency towards rational use of water as mentioned earlier. The result is that in actual practice many of the things are not actually attained and even seriously attempted by the Regulatory body of the day (because it realistically cannot) leading to perchance a loss of credibility arising out of gap between the pronouncements and attainments. *Thus, apart from affording cosmetic treatment to many of the things prescribed by various commissions the regulatory body cannot do pretty much else because it is primarily mandated to recommend actions that are practical and feasibly pass through the filters of currently extant state of political economy and public scrutiny.*

The priorities set out by the State water policy appear to be drinking or domestic-use water (we would like to add the term 'piped') followed by Agricultural use and finally Industrial use (National Framework/ Global Institute Report reverse the order of the last two). Rural Urban division sits atop this. Of course, this prioritization does not reflect on the

proportion of **allocation** set for each of these uses. These allocation proportions do not always present a biting constraint and in any case are dependent also and importantly on the technology used.

7. The Principles of Tariff Policy

The principles of tariff setting based on basic political-sociological and economic principles are fairly simply enunciated. Obviously they have to be tempered in application/ implementation by the consideration of efficiency, adequacy and equity (not necessarily in that order) and must be enforceable/ palatable to the policymakers and public at large.

The entire tariff setting exercise appears to be caught in a *vicious cycle*. The service delivery is of low quality and reliability. This is compounded by low recovery of the already whittled down assessment of revenues receivable. This then affects the capacity to invest and maintain the assets at optimal levels (or even complete the projects started) let alone technology up-gradation efforts. The circle is complete when this leads to inadequate and unreliable service delivery. ******Ironically, at the receiving end are the most vulnerable and poor who suffer from inadequate and unreliable delivery, the very ones in whose name the policy of low tariffs is promulgated!******

Let us turn to some of the available pricing options. These are **Marginal Cost Pricing** which we have already ticked off as untenable. Then there is the return on **Investment Pricing**, which involves full cost recovery of capital expenditure and operations and maintenance costs. Then we also have the convenient to implement: **Flat Rate Pricing** which could be based on average cost of service to each class of consumers. We have the more plausible **Block Rate Pricing** which is amenable to change in overhead costs per unit, as the consumption or supply increases. Further, we have **Partial Cost Pricing** which as the name suggests leads to lower price setting and leads normally to subsidized pricing for low income groups.

Basic economics teaches us that the efficient or optimal pricing is the *marginal cost pricing*. However in most cases of public utilities in general and water in particular, production and delivery process enjoys increasing returns. This means that the marginal costs tend to zero. Clearly this is therefore not useful method to set tariffs.

The investment pricing may be difficult to achieve by definition for public utilities, for otherwise they could present a viable/ bankable projects even for the private sector. Flat rate pricing has the advantage of simplicity but there are two issues here, one, that if this is differentiated on functional classes there is a possibility of ambiguity and two, covering average total costs may be difficult at the present juncture for us. A combination of block pricing and partial pricing. This will have to be telescopic in the reverse on the basis of the argument that at higher consumption water loses its quasi-public character and becomes more like a private good where efficiency criteria should come to the fore.

General considerations in tariff setting is informed by whether the beneficiaries are clearly identified and whether the benefits are precisely measurable. In the polar case obviously things are reasonable and they increase in complexity as the above mentioned parameters become fuzzy. The nature of polity and society the leadership and capacity of agents and agencies apart from the parametric framework provided by the policy framework determine the optimality of pricing. At a general level any system (including that currently under discussion) should be passed through the filter provided by the triad of **adequacy** to ensure that enough quantum of water is available for each of the activities, **equity** to ensure differential treatment on the basis of affordability and safe guard the vulnerable sections as well as usage and **efficiency** to see that optimally feasible returns are available to plough back to continue operations at efficient levels and also to introduce innovative technological up grades. This is generally acceptable but the inherent tensions make the actual price setting exercise somewhat complicated.

Apart from the triad mentioned above, tariff setting and reforms thereof has to concern itself and be in sync with or satisfy two other triads, one has to do with **policy framework** which create incentives, **capacity** of the stake holders which amongst other things endows enforceability or implementation and **processes and protocols** which when simplified reduce transactions costs. The final triad of relevance has to do with political economy filter which requires mature **polity** which is able to push through rational decisions, a mature **society** that understands and accepts the notion of common good and accepts institutional reforms and avoids elite capture and a mature economy that accepts amongst other things that there are no free lunches.

A final relatively simple but rather important principle is that *the revision in tariff structure should be formulaically embedded in the tariff setting exercise up front*. This should minimally take into account inflation and rise in production costs mainly from rise in energy costs amongst others. Any upward tariff revision creates at least a perception of disutility for the society and makes difficult to undertake for the political masters. So they don't need to keep going back every time for revision which can be rule based and hence part of the rules of the game which automatically kick in rendering such a revision optically more acceptable.

8. Putting it Together: Aspirational, Realistic and Pragmatic Position

India is on a vibrant growth path. It is also a young country and perhaps hence it is also aspirational. This creates the additional responsibility on those in government of managing the heightened expectations. India has also graduated from the low income category to the lower middle income band. Despite considerable extant poverty the policy makers must reflect this reality to the extent possible. In doing so, one needs to recognize that not only must we learn to let go of old institutions and instil the principle of 'learning to pay for your lunch'. There are some signals that this is acceptable to people, of course in return for demonstrable accountability. One of the principles that need to be adopted qua principle has to do with the concept of viability. This means that with huge resources (costs) going into the irrigation/ water sector, there has to some recognition that for this to go on, we must pay attention to the returns that we get from the sector which must clearly show a directional momentum towards covering large part of the costs incurred.

Let us however begin at the beginning with the setting of the context by looking at the extant situation in and around designing water tariffs and the structure thereof.

All the water experts and expert committees/ commissions display and overwhelming consensus in recommending – in the current state of play in India/ Maharashtra – that tariffs ought to set in manner that at the macro level the **revenues forthcoming shall cover at least the O&M costs** plus. We have apparently been following this dictum save the top-up due to capital expenditure. But there are some issues that emerge when one

looks beneath the surface. One, we do not know if the O&M is being correctly computed as per theoretical definition since authority uses what is reported to it by the relevant government department. Two, the authorities themselves at earlier times have diluted the definition by explicitly dropping some of the components that legitimately belong to the O&M basket. Three, even with this whittled down definition and hence the resulting underestimation of demand raised or assessed revenue, we find that the actual realized revenue is a fraction of it! So although the reported tables show increasing percentage of recovery rates realistic reflection will bring to the fore a rather dismal picture. To emphasize, what at we are saying is that whilst managing the optics, ***we are not even able to satisfactorily achieve what we have minimally pronounced, keeping aside the point of whether we had aimed sufficiently high to begin with!***

Thus, it is clear that the realization of revenues from the tariff setting exercise does not even the cover the O&M costs properly measured, which is the bare minimum accepted rule of the thumb in the arena of public utility pricing. *When compared to the overall capital expenditure over a long period of time which are sunk costs (and are properly measured) the recovery is absolutely miniscule and hence non-viable/ sustainable.* This is not just an economic calculation but this also has ramifications for rationality in use, conservation efforts and ultimately ecological/ environmental impacts.

Then there is the issue of the tariff *structure* leading to heavy cross subsidization. In laying out the tariff structure single minded criterion of affordability – necessarily broad sweep targeting/ interpretation at that – appears to be dominant. Neither the consideration of providing a nudge for optimal usage through signal via scarcity pricing nor the cost of supply or the value addition by the end product appears to play a role here.

The fact of cross subsidization and its extent deserves a critical look. This is because in cases where the use of water constitutes a reasonable proportion of costs of production/ raw materials and its demand is elastic as may be the case in some instances of industrial or commercial use, the relatively high price setting will lead to that much lessening of value addition. Even otherwise, given that industrial or commercial enterprises – not being charitable in nature – would invariably try to push the high

costs of production to the customers and hence the incidence/ burden of the price setting would fall on the consumers and especially the poorer ones would be hit relatively harder. Of course although this may be the case, some may argue that optically this is more desirable than directly charging the poor at a higher rate.

It needs to be noted that keeping the rate too low for all especially for the rural consumers and small agriculturists (in the name of the poor) leads to such low and hence inadequate collection that it is not able to provide investment fillip and thereby depriving the very poor of the much need good quality water. All in the name of the poor!

In any case the reported cross subsidization as read from the differential users is in a sense not revealing the true picture. To make this clear it may be useful to view the sector-wise rates through prism of a triad-frame. This should comprise of value of the product produced per unit of water, the cost of supplying/ producing a unit of water and the tariff per unit. Now typically the tariffs are set (as observed without any caveat) for irrigation use, urban use and industrial use are in the ratio of 1:10:25 or thereabouts. This is from a specific study related to an Indian case by Global water Partnership but there is no reason to doubt that this does not roughly capture the order of magnitude for us too. This appears a rather skewed cross subsidy already (even granted the arguments related to equity/ affordability et al.,) But this starts looking even more glaring when one realizes that the costs involved in supplying a the unit for irrigation is higher than for other uses by around 40%. It is even more striking when one notices that the values produced through comparable water is in the ratio of 1:2.5:27. The underlying opportunity costs involved in this dispensation are too huge to be ignored. Thus, whereas it is clear that the overall tariffs must go up the tariff structure also needs a serious overhaul. ***This triad metric could be used to rationalize the reform in tariff setting at this macro level. It needs to be underscored that such an extent and kind of cross subsidy creates perverse incentives and actually works beyond a point precisely against those who are to be helped.***

Finally, let us look at the current allocation of the quantum of to the three sectors which are pegged at 75:15:10. It needs to be noted that the 10 is not a biting constraint. Also, the contribution of these sectors to revenues are in the proportion of 19:22:59 which points to additional issues related

to cross subsidy. Perhaps one need to look at this in two ways. One, break up the overall quantum into two parts (especially for irrigation) through some bench marks and two, change the proportion at least marginally in favour of urban sector.

Now we turn to collecting the possible recommendations reading the current context and going forward as are implicit in the discussion above.

9. Recommendations, Issues for Current Consideration

It is clear that full cost recovery envisaged by various water commissions (whether to include environmental or not) as a guiding principle for tariff setting is clearly not within the realm of feasibility. This is so, not just currently but we suspect even in the foreseeable short term. Recognizing this we must still strive to continual attempt to reform our practices to align them as closely as possible to basic principles and logic. *The guiding minimal mandate must be derived from the Act, the real biting constraint will come from the filter of political economy, which with the inherent public scrutiny, will define acceptability of any prescribed policy reform.* Going forward, these considerations will be uppermost in our mind as we get on with doable stuff as recommendatory suggestions with regard to institutional reforms as well as actions that are called for.

- (i) Identify or better still **help set up a Centre of Excellence** in some academic institution in Maharashtra. As its first research project ask it to study singly or collectively all the issue and loose ends (number crunching included). This could be done through a onetime consultancy work given to some expert agent/ agency but we would very much like a centre because the need of the authority to provide evidenced based reform will need continual engagement as also such a centre will provide functionaries of the Regulatory Board as well as other governmental agencies such as WALMI/ CADA/ Water Resources department a chance to interact and refresh themselves as well as contribute to the research.
- (ii) Proper **information and monitoring system should be setup** to ensure that there is no short fall whatsoever between the revenues demanded/ assessed and the actual realization.

- (iii) Have a serious look at the exemptions/ concessions granted. It would be worthwhile to study/debate if the objectives for which the exemptions were first mooted continue to be relevant and/ or met. This is true even for the incentive concessions (for the WUAs). With a large number/ proportion of WUAs being non-existent or dysfunctional and with the tariffs set so low that the concessional grant when received by the WUAs are so low that they really serve no purpose; it is moot whether continuation has any rationale. **Rationalize, including scrap them.**
- (iv) Given the current recovery status through tariff setting. There is clearly a scope to **increase the tariffs**. The way to go about doing this is to compute the O&M costs properly (include all the items/components, cost the energy and such other costs at proper un-subsidised prices, include proper costs of maintenance of irrigation systems for one, depreciation of assets). Of course, the inflationary hedge has to be built in the computation. **The tariffs should be set so as to at least cover O&M plus 1% of capital costs (all properly computed)**. Ideally this should be increased to 3% (at least this could be hinted at to be brought about over a time horizon of 5 years). Of course, this will still not cover the cost of routine replacement of capital and service of implicit debt incurred if the capital costs are computed on the basis of historical costs rather than replacement costs. *Using the current structure of tariffs for different sectors, we can calculate the new set of tariffs. These may then be used as benchmark for adjusting the structure with the proviso that the cross subsidies are reduced to the extent possible.*
- (v) **Rationalize and reduce the cross subsidy.** This is clearly easier said than done given the woolly headed treatment that agriculture has always received in India. The way to do it is to increase the tariffs as suggested above. And then incrementally increase the tariffs on irrigation/ agriculture as a proportion of either the costs incurred or value produced. It would be easy to argue/ demonstrate that the huge gap between the agriculture/ irrigation sector as compared to urban or industrial sector will need to be filled and some movement toward

sit has to begin. Even if this movement in the right direction begins (with the ultimate goal in view) it would be step forward. A plan should be set in place/ motion (so as to gain acceptability overtime) whereby a measure for cross subsidy should monotonically be reduced to a bench mark over a set time horizon. In any case, *the structure of cross subsidy under no circumstance must worsen.*

- (vi) One way to apply the above principles is to *divide the overall water availability into two parts for each sector in a bench marked amounts for each (may be leave the industrial sector out and only consider only the rural urban sector for use of the population). The norm could be 135lpcd to as low as 50lpcd.* This should be set so as to ensure bare minimum adequacy (provided the distribution is taken care of by the agencies at the lower end). This will take care of livestock apart from people in the rural areas and some part of protective irrigation, *hence no distinction between rural and urban consumption norms.* Having taken care of bare necessities at minimal (theoretically zero prices) apply the partial block pricing principle with anything above the first part of the division mimicking market pricing. At least we should be able to apply rational principles of increase in tariffs and reduction in cross subsidies for this part.
- (vii) Get a mandate from the government for **matching grant** through and as budgetary support as an *addition* and then **ring fence** the revenues so realized for O&M plus some amount last mile completion of projects and projects related to piped drinking water in predetermined proportions.
- (viii) **Move away from setting tariffs based on extant cropping pattern and technology** but rather move to more scientific basis of topography/ geography and geomorphology with obviously the average precipitation and broadly agro-climatic zoning. Ideally, with minimum differentiation allow/ nudge/ incentive with information so that agriculture as a whole starts moving away from path dependency and towards the thus far elusive goal of optimal cropping pattern with optimal technology usage.