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RESEARCH ARTICLE

WTO Agreements and Dimensions of India's Foreign Trade: Food Security, Water and Environment

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ABSTRACT

The Agreement on Agriculture (AoA) under the World Trade Organization came into effect on 1st January 1995. The AoA insists to establish a fair and market oriented system through the process of negotiations of commitments on support and protection through operational rules and disciplines in the areas of market access, domestic support and export subsidies. It was envisaged that progressive reduction in agricultural support and protection over an agreed period of time would result in correcting distortions in world agricultural markets resulting in greater improvement in opportunities for realization of market access for member countries particularly the developing countries. There are many studies on impact of trade liberalization and WTO agreements. They show that the trade volume of India is increasing slowly. At present we are in the position to view seriously the impact of increased Indian foreign trade on three important and closely related areas that are food security, water and environment. Study on the impact of foreign trade on these areas becomes need of the hour on the following grounds: Food security is severely threaten by stagnant food production; shrinking in food production area; slow down in yield of food crops; overall slow down in the growth of agriculture; and, increase in absolute size of population and demand for foodgrains. Per capita water availability is decreasing sharply in the recent years; and, widespread water conflicts occur among water using sectors. Environment becomes another important area which is closely connected with the external trade. Because, every production discharges residual, and thus increased production with the view to export definitely brings pressure on the environment. Thus the study aims to view the size of external agriculture trade in the liberalized era through WTO agreement; to examine the change in direction and pattern the trade; to investigate impact of the trade on food security, water and environment; and to suggest policy measures to ensure the Indian food security, protect water resources and save the environment through trade mechanism. The present paper is carried out in this direction. In order to get clear picture of impact of foreign trade on the above respect, a comparative analysis is done between two periods ie. before the implementation and after implementation trade agreements.

INTRODUCTION

There are many studies conducted in India on impact of the trade liberalization and WTO agreements. They show that the trade volume of India is increasing slowly. At present we are in the position to view seriously the impact of increased India's foreign trade on three important and inter-related domains that are food security, water and environment. A fresh study on the impact of foreign trade on these areas becomes the need of the hour on the following grounds: food security is severely threaten by stagnant food production; shrinking in area food crop cultivation; slackening the growth of yield of food crops; overall slowdown in the growth of agriculture; and, increase in absolute size of population and demand for food grains. Per capita water availability is decreasing sharply in the recent years; and, widespread water conflicts occur among water using sectors. Environment becomes another important area which is closely connected with the external trade. Because, every production discharges residual, and thus increased production with the view to export definitely lays pressure on the environment.

Objectives of the Paper

The study aims to view the size of external agriculture trade in the liberalized era through WTO agreement; to examine the change in direction and pattern of the trade; to investigate impact of the trade on food security, water and environment; and to suggest policy measures to ensure India's food security, protect water resources and save the environment through trade mechanism.

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MATERIALS AND METHOD

For the study data collected from various secondary sources like Annual Agricultural Statistics by Ministry of Agriculture and Co-operation; electronic data published by Director General of Commercial Intelligence Statistics, Kolkotta; various published reports and journal articles. Collected data are analysed with the help of percentage, standard deviation, annual compound growth rates and linear trend analysis.

DIMENSION OF AGRICULTURAL EXPORT

India exports variety of agricultural commodities since the ancient period. However, the share of agricultural commodities exports is decreasing slowly due to structural changes in the economy that takes place and its reflection on foreign trade. Now, share of agricultural commodities exports in total national exports is pulled down because of sharp expansion in the export from service sector. The share of agricultural commodities exports mostly comprising food-grains, oil seeds, edible oils, plantation crops, spices, vegetables and floriculture product, is nearly 20 % up to 1999-2000, and after that it is fluctuated around 15 per cent and reached 10.5 per cent 2010-11. However, export of agricultural commodities in absolute terms – both in quantity and value – is sharply increasing year after year. The value of agricultural export is increased from just Rs.6,013 crores in 1990-91 to Rs.1, 20,185 crores in 2010-11. In the total export of agricultural commodities, export of food grains, consisting of rice, coarse cereals and pulses, is significant one.

The quantity of food grains export is increased from just 669 thousand tones in 1990-91 to 9,861 thousand tones in 2007-08, and after that it has decreased remarkably and reached 5,676 thousand tones in 2010-11. In terms of value it is increased from Rs.472 crores to Rs.7,490 crores during the period between 1990-91 and 2010-11. This tremendous increase in food grain exports is achieved with the help of increased production through the continuous efforts taken by the farm sector in post-Green Revolution period. The share of food grain export in terms of value in total agricultural export is around 10 per cent in the initial period under analysis, and after that it is around 20 per cent. Due to ban on rice export, this percentage of food grains export is suddenly decreased to 13 per cent in 2011-12. From this we can understand the importance of food grains export in total agriculture exports.

less. So, wheat export is highly erratic and uncertain. At the same time, even though it is meagre quantity, pulses and other food grains share with food grains exports, are increasing steadily over the time. Among non-food grains export, oilseeds, edible oil, tobacco, marine products, cashew nut, cashew nut oil, spices, tea, coffee and cotton are important items. Their export levels are increasing considerably during the period under analysis, both in terms of quantity and value. However, export of vegetables, fruits, floriculture products, poultry items, meat items are not good enough in the total agriculture commodity export.

WATER RESOURCES

According to the information provided by Union Ministry of Water Resources, the present annual water availability in India is nearly

Table 1. Agricultural commodities export and the share of important food-grains (Quantity in '000 tones; Value in Rs. crores)

Year	Total Value of Ag. Export	Total food-grains Export			Rice Export				Wheat Export		
		Quantity	Value	Value as % in the total value of ag. Export	Quantity	Value	%in total value of ag. export	As % in the total value of food grain export	Quantity	Value	% in Total value of ag. Export
1990-91	6013	669	472	7.85	527	440	7.32	93.22	134	29	0.48
1991-92	7838	1279	890	11.35	678	756	9.65	84.94	587	127	1.62
1992-93	9040	669	1049	11.60	580	976	10.80	93.04	37	10	0.11
1993-94	12587	1285	1395	11.08	1092	1287	10.22	92.26	Neg	Neg	Neg.
1994-95	13223	1112	1367	10.34	891	1206	9.12	88.22	87	42	0.32
1995-96	20398	5636	5084	24.92	4914	4568	22.39	89.85	632	367	1.80
1996-97	24161	3784	4051	16.77	2512	3172	13.13	78.33	1146	698	2.89
1997-98	24832	2574	3745	15.08	2389	3371	13.57	90.01	2	Neg.	Neg.
1998-99	25511	5079	6514	25.53	4964	6281	24.62	96.40	2	Neg.	Neg.
1999-00	25314	2096	3555	14.94	1896	3126	12.35	87.93	Neg.	Neg.	Neg.
2000-01	28657	2634	3923	13.69	1531	2932	10.23	74.74	813	415	1.45
2001-02	29729	5164	4989	16.78	2209	3174	10.67	63.62	2649	1330	4.47
2002-03	33126	8490	7490	22.61	4968	5831	16.19	77.85	3570	1700	5.13
2003-04	37266	8263	7285	19.54	3412	4168	11.18	57.21	4093	2391	6.41
2004-05	41602	8236	9625	23.13	4778	6769	16.27	70.33	2009	1459	3.50
2005-06	49216	5849	8347	16.95	4088	6221	12.64	74.53	746	557	1.13
2006-07	62411	5775	8443	13.52	4748	7036	11.27	83.34	46.64	35.35	0.05
2007-08	79039	9861	15283	19.33	6469	11755	14.87	76.92	0.24	0.24	Neg
2008-09	85951	6625	15626	18.18	2488	11164	12.99	71.45	1.12	1.46	Neg
2009-10	89341	5148	14635	16.38	2156	11255	12.57	76.90	0.03	0.05	Neg
2010-11	120185	5676	15251	12.68	2283	10802	9.00	70.83	0.44	0.74	Neg.
Trend coefficient	4573	345.9	753.7	-	149.6	535.1	-	-	33.51	10.55	-
R^2	0.835	0.577	0.867	-	0.278	0.821	-	-	0.024	0.008	-

Source: Ministry of Agriculture and Co-operation, Agricultural Statistics, 2005, 2010 and 2011, Govt. of India.
Note: 1$ = Rs.46.87 (average value in 2010-11)

Among food grains export, rice (both *Basumati* and non-*Basumati* varieties) is a major commodity and its share in total food grains export is more than 80 per cent for many years during the period under analysis. The share exceeds more than 80 per cent in 10 out of 21 years taken into consideration. Only in the year 2003-04 the percentage of rice export in total food grains export is minimum, which accounts 57 per cent and in the remaining years it is more than 65 per cent. There is a close and strong association between the value of food grain export and the value of rice exports. Share of rice export in total agricultural commodities export has increased sharply and significantly after 1992-93. It is always more than 10 per cent from that period. It is also more than 10 per cent in 18 out of 21 years taken into consideration. In absolute terms, the quantity of rice increased from just 134 thousand tones in 1990-91 to 6,469 thousand tones in 2007-08, however it is decreased to 2,283 thousand tones in 2010-11 due to ban on rice export as a result of domestic price hike. In terms of value, the rice export has increased from Rs.440 crores to Rs.10,822 crores during the same period. Trend coefficients estimated for the data show that the rates of change in export volumes are highly significant. But share of wheat export is highly fluctuating over the period. In most of the years the share of wheat export (in terms of value) is less than 1 per cent. It is nearing 5 per cent only during 2001-02 and 2002-03. After that it accounts one percent or

4,000 km^3. Per capita annual utilizable water availability is drastically decreased from 3,450 m^3 in 1951 to 1250 m^3 in 1999, and it is expected to further decrease to 760 m^3 in 2050 A.D. (IGIDR, 2000). Out of the total fresh water supply rivers, lakes and other water bodies as surface water, capture only 1780 km^3 of water. Out of this only 50 per cent can be put in to beneficial uses because of topographical and other constraints. India has many numbers of dams in various sizes. But, scopes for building of new dams were affected by stiff opposition from the environmentalists, sharp resistance from the peoples of proposed dam construction area, increasing costs of dam construction and financial crunches of governments, and lack of co-operation from states those who have common river basins.

Another major constraint of this sector is accessibility and distribution of water and it is not uniform across space and time. Precipitation is limited to only about four or five months in two narrow monsoons. The annual average rainfall varies from 10 cm. in Western part of Rajasthan to over 1000 cm. at Cherrapunji in Megahalaya. Surface sources often run empty in the summer and ground water availability varies from rich aquifers of Indo-Gangetic-Bhramaputhra plains to the comparatively low yielding hard rock regions of Peninsular India. As against the sharp reduction of fresh water supply, demand for water is increasing rapidly due to agricultural, industrial and population growth. According to the Ministry of Water Resources (1999), as per

the lower bound on demand projected for water in all sectors put together, it will increase from 644 km^3 in 2010 to 1214 cubic kilometer in 2050. Similarly, as per the higher bound demand for water will increase from 733 km^3 to 1674 km^3, respectively in the above said period. It indicates that there are some concrete efforts to harness more fresh water. Another serious problem is some of the major rivers like *Godawari*, *Krishna, Narmada, Ravi and Beas*, and *Cauvery* which are under inter-state disputes over sharing the river water.

RESOURCE CONFLICTS AND ENVIRONMENTAL ISSUES

Generally, the agricultural sector uses more water than other sectors. In India, the agricultural sector consumes 84 per cent of the total water available for all sectors. Industrial and domestic sectors share 12 and 4 per cent, respectively. The increased demand for water from all sectors leads to inter-sectoral conflicts. Sector-wise water demand estimates by (Standing Sub-Committee of) Ministry of Water Resources, and National Commission on Integrated Water Resources Development (Chawla et. al., 2012) differs significantly. But both the estimates exhibit a similar pattern of future water demand. According to the first estimate, the percentage share of agriculture will be 74 per cent in 2050, against 84 per cent in the year 2000. The second estimate shows that the percentage of agricultural demand has decreased from 78 per cent in 2000 to 68 per cent in the year 2050. Both the estimates show that the future water demand for agriculture is largely reduced by non-agricultural sectors like industry and domestic sector, significantly. Some sections of society enjoy more water resources than others. Their inefficient use of water affects the stock of water resources. And, it further affects equitable distribution and sustainability of such scarce resources. With the diminishing stock, widespread conflicts occur over sharing of water among nations, states, regions, between upstream and downstream users, among different stake-holders like agriculturists, industrialists, domestic users, fishermen, etc. Competitive deepening and increased users of a common aquifer lead to ground water conflicts (Janakarajan 1997 & 2006), in many areas, particularly in non-canal command areas of different basins.

At the same time, water is heavily polluted by increased activities of human beings. Water is essential for survival. But presently about 200 million people in India do not have accessibility to safe drinking water. The major sources of water pollution are domestic sewage, industrial effluent and agricultural return flow. Rivers, streams, canals and ground water are severely polluted. Deterioration in both surface and ground water qualities leads to loss in economic value of the resource. Most of the water sources are polluted by untreated or partially treated waste water from different sectors. According to Ministry of Rural Development, about 1.5 million children under the age of 5 years die each year due to water related diseases, and the country also loses over 200 million man-days of work a year because of water-born diseases like Diarhoea, hepatitis, roundworm, hookworm, lymphatic filariasis, etc. (Parik, 2004).

With the increasing ground water exploitation, inorganics like fluoride and arsenic present below the ground also find their way into extracted water. They cause fluorosis and arsenic poisoning. Ground water pollution is particularly serious as 80 per cent of domestic water needs are met out from this source. Studies on chemical composition of ground water have revealed that in many cases a high concentration of nitrate, potassium and even phosphate are present in aquifers. Unsystematic uses of chemical fertilizer and improper water management have resulted in deterioration of ground water quality in many parts of the country. National Water Policies of 1987 and 2002 stress that water rates should be such as to convey the scarcity value of resource to the users and to foster the motivation for economy in water-use (Ministry of Water Resources, 1987 and 2002). If market forces guide the water input, then farmers will use it in an efficient manner. If it happens, they will shift their crop from low monetary to high monetary value. They will calculate and consider the productivity of water as in the case of land and labour input. Currently, cost of water input is highly subsidized. Due to various social-economic-political reasons, imposition of full-cost price of water is avoided. Water managers are implementing various strategies to manage ever decreasing – both quantitatively and qualitatively – water resources.

Scenario of Irrigation Sector in the Past and Present

When compared to other sectors, demand for water increased largely in agriculture in the past. The demand for irrigation water sharply increases along the increase in area cultivated as a result of extensive agricultural strategies. At the same time, there is a steady increase in the area brought under irrigation due to intensive agricultural practices followed through Green Revolution. Net area sown has increased from 118.75 million hectares in 1950-51 to 141.36 million hectares in 2009-10. In the same period, the net area irrigated has increased from 20.85 to 63.20 million hectares. In terms of percentage of net area irrigated to net area sown has increased from 17.10 to 45.32 during the period under consideration. At the same time, the percentage of gross area irrigated to net area cultivated has increased from 20.85 % to 63.20 %. In other words, the area irrigated more than once is greatly increasing, which shows that the farmers intensively use water resources along with time. When we look at the figures by crops, on an average rice (more than 25 % in total cropped land) and wheat (more than 20 %) are sharing jointly nearly 50 % of the total cropped land of the country. Mostly they are cultivated as irrigated crop and they require larger quantity of water than other food crops and cash crops. Punjab, Hariyana, West Bengal, Andhra Pradesh and Tamilnadu are major rice producing states. And, wheat is produced mostly in Uttar Pradesh, Punjab and Hariyana.

As a result of extensive as well as intensive use of water and land resources, the food grain availability is increasing considerably. Food grains availability per capita per day has increased from 395 grams in 1951 to 454 grams in 2000, and it has decreased to 438 grams in 2010. Within this increase in food grains availability, share of rice and wheat increased tremendously, which also offset the decreasing rate in the per capita availability rate of cereals, grams and pulses. When we look at this in terms of water, the water intensive food crops have increased largely and less water needed crops are ignored along with time.

Chemical Input Consumption and Water Intensive Crops

Farmers who rely upon canal water use, commonly more water. If water is stored in the field more than the required amount, then it will cause water logging and salinity problems to land. To avoid salinity and alkalinity farmers use again chemicals. There are a number of different estimates on the extent of area affected by water logging, salinity and alkalinity in India. A recent estimation by Ministry of Water Resources shows that 1.63, 3.07 and 1.28 million hectares lands have been affected by water logging, salinity and alkalinity, respectively. The problem is more serious in water scarce states than in rich water potential states.

Level of irrigation decides the level of utilization of various modern inputs, including chemical components. Study by Vaidyanathan et.al. (1994) found that regions with a high level of irrigation tend to use more fertilizers per hectare from 1970s onward. Farmers with assured water supply always go for intensive cultivation and they use lands in successive seasons. Subsequently, the lands will lose their fertility. Then farmers will start using more fertilizer to compensate the nutrient loss.

As stated earlier, in water abundant areas farmers usually cultivate water intensive crops like paddy. Paddy requires more fertilizer and pesticides. National level statistics for fertilizer consumption shows a fast rate of increasing trend. The quantity of fertilizer consumption has increased from just 66 thousand tones in 1950-51 to 28,122 thousand tones in 2010-11 (increased 426 times). Per hectare consumption of fertilizer has tremendously increased from less than 1 kg. to 144 kgs. in the above said period. In 1991-92, the per hectare

consumption is 70 kgs. and now the time it is more than double. Cross section analysis of fertilizer consumption shows that states like Panjab, Hariyana, West Bengal, Andhra Pradesh and Tamilnadu are using more quantity of fertilizer to per hectare of land. The quantity is significantly larger than the national average, and it is also the top most in their respective regions. The above said states are leading in rice cultivation. As a result of intensive cultivation and the introduction of short duration varieties there is more use of pesticides. Crops like paddy and cotton require more pesticides. Now-a-days, many pests have tolerance capacity. So, farmers use more pesticides than the earlier period. From the analysis we can perceive the idea that water intensive crops use more chemical inputs, which in turn affects the quality of water through the agricultural return-flow. Uses of inorganic chemicals affect both surface and ground water quality, which is used for drinking and irrigation purposes by downstream users. Generally, farmers consider lifting cost alone decide the cost of water input. But there is other economic cost including operation and maintenance, depreciation and interest on capital items and opportunity cost. Apart from these there is environmental cost for irrigation water ie. cleaning up cost of downstream users.

AGRICULTURAL PRODUCTION AND STATE OF SMALL PEASANTS

Agricultural growth is not uniform throughout the past. It declines seriously in many sub-periods. When we look at the growth rate by crops or groups of crop, it is even negative for certain cases. This trend is severe for food grains during the era of globalization. Table 2 gives clear evidences for the above said views.

Table 2. Annual Compound Growth Rates of Important Crops

Year / Crop	1980-81 to 1989-90			1990-91 to 1999-2000			2000-01 to 2010-11		
	Area	Pdn.	Yield	Area	Pdn.	Yield	Area	Pdn.	Yield
Rice	0.41	3.62	3.19	0.68	2.02	1.34	-0.10	1.51	1.61
Wheat	0.46	3.57	3.10	1.72	3.57	1.83	1.28	2.16	0.87
Coarse Cereals	-1.34	0.4	1.62	-2.12	-0.02	1.82	-0.75	2.80	4.24
Total Cereals	-0.26	3.03	2.90	0.04	-0.02	1.59	0.09	2.01	3.19
Total Pulses	-0.09	1.52	1.61	-0.60	0.59	0.93	1.62	3.35	1.90
Food Grains	-0.23	2.85	2.74	-0.07	2.02	1.52	0.37	2.12	2.89
Sugarcane	1.44	2.70	1.24	-0.07	2.73	1.05	1.12	1.64	0.52
Oil seeds	1.51	5.20	2.43	-0.86	1.63	1.15	2.14	4.60	3.59
Cotton	-1.25	2.80	4.10	2.71	2.29	-0.41	2.60	13.8	10.91
Non-food grains	1.12	3.77	2.31	1.18	2.69	1.09	2.16	3.67	2.49
All Crops	0.1	3.19	2.56	0.27	2.69	1.33	0.91	2.50	3.25

Source: Calculated on the basis of information provided by Ministry of Agriculture and Co-operation, Govt. of India.

According to the data provided in above table, annual compound growth rate of important food grains like rice, cereals and pulses are declines – in terms of area under crop, yield and production -- over the period under analysis. Non-food grains like oilseeds and cotton also show declining annual compound growth rates. Similarly, per capita production of food grains increased slowly and at the same time per capita availability of food grains during the era of globalization is declining significantly. Table 3 provides information on per capita food grains production and availability during globalization period.

Table 3. Per capita Food grains Production and Availability

Five years Moving Average	Per Capita Food Grains Production (in Kgs./Year)	Per Capita Food Grains Availability (in Kgs./Year)
1991-95	180.8	175.9
1996-00	200.5	171.2
2000-05	201.5	155.0
2006-10	229.0	163.0

Source: Computed on the basis of data collected from Ministry of Agriculture and Co-operation, Government of India.

As reported earlier, more than 60 per cent of the people in India depend upon agriculture. Mainly they are marginal and small peasants and landless agricultural workers. There are distress sales among marginal and small farmers. Agricultural workers also sell out their food grains earn as wages in kind form. They mainly depend upon public distribution system for the livelihood. Marginal and small farmers also are affected by inter-linked agrarian markets and lose most of their surplus produce as kind payments.

NEED FOR CHANGE IN DIMENSION OF EXPORT

From the basic theory of international trade, one may understand that we can produce more and export commodities which require less level of input. But the earlier sections of ongoing analysis tell us that we produce and export more commodities which require more inputs. From the Indian experiences, inputs like water, fertilizer, pesticides and energy is heavily subsidized for our farmers. So, farmers do not realize the true cost and actual - both economic and environmental – value of inputs and thus real cost of cultivation of products is not reflected in their price. We need sufficient quantum of food grains such as rice and wheat to ensure food security of the nation. Then, our purpose is not to recommend curtailing the production of food grains to the level of reduced domestic demand. But we can suggest reducing the rice production up to the level to curtail the export demand of rice. At the same time we are in the position to manage the adverse balance of payment situation. Then we should reduce the export of water intensive crop and should compensate this loss by exporting agricultural commodities which requires less level of water. It is essential to reconsider the composition of export trade with a view of better and sustainable use of the key agricultural input viz. water, which is becoming a scarce commodity now-a-days.

Solution viewed as Water Quantity Management: From the earlier analysis we have understood that rice, which is water intensive crop, is exported more among food grains and as well as among all commodities included under agricultural export. It is observed that in an average 10 per cent of the annual production of rice is exported. Rice is mostly produced in states like West Bengal, Punjab, Andhra Pradesh, Tamilnadu, etc. which are presently in water stress position. When we look at the crop productivity according to the volume of water used or to crop-water requirement, we should ignore the export of rice which yields less revenue to per unit of water. An earlier studies by IWMI (1996) and MIDS (1998) revealed that the yield of rice to per m^3 water used is comparatively lower than crops like turmeric, banana, tobacco, sugarcane, groundnut and *ragi*. At the same time rice is not suitable to modern irrigation methods like drip or sprinkler irrigation, which largely reduce the conveyance loss, application rate loss and loss through direct evaporation. So, we could produce and export more (water efficient commodities) produces like banana, groundnut, sugarcane, turmeric, vegetables, fruits, etc. which give more returns to per unit of water and which facilitate the use of modern methods of irrigation. These may considerably reduce demand for water for crops and helpful to manage water in a sustainable manner at least to some extent.

Solution viewed as Water Quality Management: Crops like rice and cotton require more chemical fertilizer and pesticides when compared to other crops. Since they are seasonal crops, the lands are

cultivated intensively in most part of the year. Normally, lands like these require more chemical fertilizer in order to balance the nutrient levels. If crops cultivated successively in a piece of land, season after season, then rate and quantum of application of pesticides may be higher. This intensive cultivation of crops like rice not only affects the water resources by demanding more water but also degrading the quality of water by way of requiring more chemical inputs. Naturally, if we cut down the export portion of rice production, we will save the water both in terms of quantity and quality, to some remarkable extent. Further, food grains export will affect the interest of landless agricultural workers, marginal and small farmers through hike in domestic price and reduction in availability for consumption. We export food grains at the cost of welfare lost by the weaker sections of the community.

CONCLUSION

Now, our nation is in the position of food security. We should maintain this security with the view of increase in size of population. And we need to safeguard the interest of weaker sections, particularly landless agricultural workers, marginal farmers and small farmers. For that, we should manage our water and environmental resources very carefully in a sustainable manner. By avoiding or minimizing export of water intensive crops like rice, we can save larger quantum of water as well as reduce the level of water pollutants to a certain extent. At the same time we can expand (at the cost of reduced export portion of rice production) the cultivation and enhancing export of less water requiring crops as well as the crops which are suitable for modern irrigation methods. We should be very cautious about globalization and we need restricted form of trade in order to safeguard the interest of farming community, particularly landless agricultural workers, marginal and small farmers.

REFERENCES

Ahmad and Haseen, "The Performance of India's Food Grains production: A pre and Post Reform Assessment", *International of Scientific and Research Publications*, Vol.2, Issue 3, march 2012.

Dhawan B.D., "Irrigation Impact on Farm Economy", *Economic and Political Weekly*, Vol. 20 (39), September 1955, pp.A.124-28.

Flakenmark, "Global Water Crisis – Differences in Regional Predicaments", International Shige Forum, UNEP, November 1996.

Falkenmark, Malin and Lundquist, Jan, "Towards Water Scarcity: Political Determination and Human Adaptation Crucial", *Natural Resource,* Vol.21 (1), 1995, pp.37-51.

Freeman A.M., The Measurement of Environmental and Resource Values: Theory and Methods, *Resource for the Future Washington*, D.C., 1993.

Gleick, The World's Water: 1998-1999, Iland Press, Washington DC., 1998.

Government of India (Ministry of Water Resources), *"National Water Policy"*, 1987 & 1992.

Government of India (Ministry of Water Resources), "*General Facts"*, Website: http://www.wrmin.Nic.in, January 2000.

Government of India (Ministry of Agriculture and Co-operation), "*Annual Reports"*, New Delhi, 1991 to 2011.

Indira Gandhi Institute of Development Research (IGIDR), "Clean Water", *Environmental Governance* - 1, 2000.

Janakarajan. S, "Consequences of Aquifer Over-Exploitation: Prosperity and Deprivation", *Review of Development and Change*, 1997, 2(1). P.52-71.

Janakarajan, S., and M. Moench, "Are Wells a Potential Threat to Farmers' Well-being? Case of Deterioriating Groundwater Irrigation in Tamilnadu", *Economic and Political Weekly*, 2006, pp.3977-87,

Kannan and Sundaram, "*Analysis of Trends in India's Agricultural Growth*", Working Paper 276, ISEC, Bangalore, 2011.

Madras Institute of Development Studies, "Natural Resource Accounting for Water Resources in the Bhavani Basin", Madras 1998.

Molden, David, et.al., "Basin-Level Use and Productivity of Water: Examples from South Asia, *IWMI, Colombo*, 2001.

Parikh, J. (2004). "Environmentally Sustainable Development in India", available at http://scid.stanford.edu/ events/India 2004/JParikh.pdf last accessed on 22 August 2008.

Savadatti, "An Econometric Analysis of Demand and Supply Response of Pulses in India", *Karnataka Journal of Agricultural Science*, Vol.20(3), 2007, p.545-50.

Vaidyanathan, A., et.al., "Impact of Irrigation on Productivity of Land", *Madras Institute of Development Studies, Madras*, 1994.

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