# Regulation of fertilizer trade for improved town planning: An analytical research

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## Introduction

The usage of fertilizers in the country has been done to improve the yield and make it easier for the farmers to trade in the market with better crop. These fertilizers have positive but temporary effects on the crop. They mostly tend to deteriorate the soil health and also pollute the underground water. Fertilizer trade in India is regulated by the fertilizer control order, 1985 and this order has been passed to facilitate the trade which was ambiguous until 1985 under various other legislations. This paper will discuss why there is a need to put an exact quantity cap on the sale and purchase of fertilizers and what is the existing lacuna with regard to the matter. Smart cities are an upcoming concept in the world where countries are moving towards better infrastructural goals and it is executed by considering various physical, social and economic factors. The biggest challenge in smart city development is the environmental pollution, specifically land and water pollution. Land and water are two interlinked factors on which smart cities rely to establish the advanced infrastructure and this paper will discuss the various challenges and solutions with regard to the same.

Abstract

The Fertilizer control order, 1985 (further referred to as the FCO) is the legislation which governs both the import and export of fertilizers in India. This legislation also provides for the composition of certain fertilizers and not all of them. Schedule I of the order provides for composition of the individual fertilizers, the moisture content and the chemical content in each fertilizer component but fails to address the issue of the bulk mixture of the fertilizers. The most commonly used fertilizer components are N, P and K which are nitrogen, phosphorous and potassium respectively. They fail to address the mixture of fertilizers like ammonium nitrate and potassium nitrate which contain a mix of N, P, K and other chemical components as well. The researcher aims to bring the need to introduce an exact number or a percentage cap for every fertilizer component in bulk or individually as it is detrimental to the soil and underground water health otherwise which will be explained in this paper.

Smart city establishment and development does not individually include building new lands like the Bhindi bazaar project in Mumbai but also rejuvenation of the existing land. This rejuvenation of the old land faces challenges due to the existing polluted water and land of which one of the major causes is the overuse of fertilizers. It obstructs various developmental projects and policy implementations as it degrades the soil quality. This paper aims to discuss the need to introduce strict regulatory measures for the trade of fertilizers in India as it will decrease the pollution and improve the conditions for the people to live a healthy life which will aid the development of smart cities and town planning.

Literature review

The claim statement is whether the regulation on trade of fertilizers and providing a quantity cap result in better soil health and in turn support town planning?

This section includes analysis of the existing literature pertaining to the present study.

1) Journal articles

The town and country planning organisation (further referred to as the organisation) was set up in 1962 by merging two organisations *i.e*., the town planning organisation and the central and regional planning organisation. They were established to evolve a plan for the region of Delhi and also initiate developmental plans at the urban and local levels. This organisation functions under the ministry of Housing and Urban affairs, Government of India. The administration of town planning in India under the organisation is divided into various departments *viz.*, the environmental planning division, the metropolitan and union territories division and the regional planning division, to name a few. These divisions brainstorm the plans and policies and put it forward to the states and regions for further implementation.[1]

The Atal Mission for Rejuvenation and Urban Transformation (AMRUT) reforms is an initiative by the planning organisation to provide basic amenities like water supply, urban transportation, sewerage, waste management and overall better infrastructure to the poor and disadvantaged. There are a set of 11 reforms to be initiated in over 500 cities within 4 years. One of the reforms is better environmental conditions in the urban areas. The thrust areas include water supply and increasing the amenity value of urban cities by creating and upgrading green spaces, parks and recreational centres.

The water supply provisions provided for in the AMRUT reforms are as follows:

1. Water supply systems including augmentation of existing water supply, water treatment plants and universal metering.
2. Rehabilitation of old water supply systems, including treatment plants.
3. Rejuvenation of water bodies specifically for drinking water supply and recharging of ground water.

[1] Official Website of Town and Country Planning Organisation, Government of India | Official Website of Town and Country Planning Organisation, Government of India, , http://tcpo.gov.in.

4. Special water supply arrangement for difficult areas, hill and coastal cities, including those having water quality problems (*e.g.* arsenic, fluoride).

The sewerage management provisions provided in the AMRUT reforms are as follows:

1. Decentralised, networked underground sewerage systems, including augmentation of existing sewerage systems and sewage treatment plants.
2. Rehabilitation of old sewerage system and treatment plants.
3. Recycling of water for beneficial purposes and reuse of waste water.[2]

In India, even though only 32% of the population lives in the cities, we are focussing on the negative externalities such as waste management, pollution control and climate change rather than the positive externalities such as development of municipalities, sewerage systems and town planning. This is highly influenced by the amount of pollution entering the cities and getting transferred into other cities due to the water cycle.[3]

The urban water cycle is an important aspect of town planning. This water cycle can be explained as follows; the rain water being collected in the urban areas flows though channels into the agricultural water system and then is finally drained through rivers into the seas. In the urban areas, the rains are often a curse than a boon as the planners insist on flood prevention measures rather than harvesting that rainwater. Rain water is an effective tool for urban development and town planning. The surface run off is often ignored and the infiltration in urban landscapes is extremely low. If steps are taken to improve this infiltration then the various aquifers which are underground water collections deep beneath the earth can be rejuvenated. These aquifers are less exposed to pollution and can be a better option for drinking water if harvested.[4] However, the water in the urban areas which is treated gets contaminated with fertilizers excesses while flowing through the agricultural systems and then the rivers. The river water thus gets polluted. Also, the polluted water seeps down into the underground water contaminating it.

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[2] Official Website of Town and Country Planning Organisation, Government of India | Official Website of Town and Country Planning Organisation, Government of India, http://tcpo.gov.in.

[3] Divya Sharma & Seema Singh, *Instituting Environmental Sustainability and Climate Resilience into the Governance Process: Exploring the Potential of New Urban Development Schemes in India*, 19 J. IASR, 90-103 (2016).

[4] Sybrand Tjallingii, *Sustainable Urban Environments: An Ecosystem Approach*, Water flows and urban planning, 91-111 (Springer 2011).

Urban Infrastructure Development Scheme for Small and Medium Towns (UIDSSMT) is one of the plans implemented by the organisation in the country where a total of 466 projects have been physically completed which includes 297 water supply, 18 sewerage, 33 storm water drains, 18 solid waste management, 7 urban renewal, 8 preservation of water body, 83 roads & 1 each parking and prevention of soil erosion. Such efforts need to be appreciated but these activities are in the danger of being affected by fertilizer runoff which is a major component of water pollution.

The water pollution is a part of town planning which needs to be corrected. In the research paper[5], out of the 24 samples taken from different agricultural lands in the city of Mysore, the nitrate and phosphate levels in the water were found to be higher than the limit prescribed by the World Health Organisation which is not specified but estimated around 50 mg/L for nitrate and 100ng/L of nitrogen – phosphorous combined in drinking water[6]. The pH level of the water was very high (accepted present limit is 6.5 -12pH). The study revealed that leaching and surface run off were the major causes of water pollution.

The Ganga pollution case is often quoted to highlight the impact of water pollution on the social and physical wellbeing of the people. One of the major pollutants highlighted in the Ganga case was the harmful discharge of fertilizers from the agricultural runoff which was due to excessive and unnecessary application of the fertilizers. Improper application, such as the application of fertilizer prior to a rainstorm led to fertilizer runoff. The end result is less available oxygen for the inhabitants of the water system which results in crippling the water ecosystem in particular and ultimately the environmental system. The main risk from fertilizer runoff is the over production of algae which deoxygenates the water. It was also identified in the M C Mehta case[7] that fertilizers are a major part of the agricultural waste polluting the Ganga.

Let us now discuss some of the common water pollution effects of applying chemical fertilizers to the soil.

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[5] Divya J & Belagali S.L, *Impact of chemical fertilizers on water quality in selected agricultural areas of Mysore district, Karnataka, India*, 2 AGRIS ON-LINE PAPERS IN ECONOMICS AND INFORMATICS, 1449-1458 (2012).

[6] World Health Organisation, *Nitrate and Nitrite in Drinking-water, Background document for development of WHO Guidelines for Drinking-water Quality*, NITRATE AND NITRITE IN DRINKING WATER, (Jan.17, 2017), https://www.who.int/water_sanitation_health/dwq/chemicals/nitrate-nitrite-background-jan17.pdf.

[7] M C Mehta v Union of India [Mehta I], (1987) 4 SCC 463.

The water pollution due to the unnecessary use of these fertilizers causes immense loss in terms of health of the people. The water mainly gets polluted through three ways from the agricultural waste release *i.e.*, drainage, leaching and flow. Nitrate leaching is one of the most common ways of leaching in agriculture. The nitrates accumulate in the soil. This nitrate accumulation is due to the action of the microorganisms which convert the fertilizer in to nitrates. This converted nitrate is used up by the plants only up to 50% and the rest of the nitrates either evaporates or goes down into the underground water. Nitrates are harmful to human health if consumed untreated, which is the present case at hand. This contaminated underground water gets into the wells, bore wells and as underground water. This is a global issue which needs to be tackled as soon as possible to avoid future losses.[8]

Right behind California, Texas is Nebraska, which ranks fourth in the agricultural output in the United States. The farmers due to long standing concerns started combining natural fertilizers from the river, which is the nutrient rich soil and started combining it with the chemical fertilizers that led to the most common consequence which is the nitrate water pollution. The legal limit for nitrate in Nebraska is 10 parts per million but in Nebraska it is two to three times the permissible limit. The growth of deep rooted plants is best suited in the area. However, due to the presence of chemical fertilizers the soil structure is lost making it difficult for the roots to hold on to the soil. The excess nitrogen weakens the soil structure. This is another example of why chemical fertilizers applied in excess are a hazard to the town planning as it disturbs the agricultural activities, one of the chief components to run the economy.[9]

Soil compaction is one of the most common effects of excessive application of fertilizers to the soil. This reduces the soil permeability as there is a layer of mineral salts accumulated on the soil in excess. It has been proved in the variance analysis method that the excessive application of the fertilizers, soil compaction has decreased porosity by over 81.4%, available water by 34% and yields by 40%. It was proved that the excessive application of fertilizers led to formation, accumulation and compaction of mineral salts that decreased the porosity and aeration in the soil. This as a result does not allow the soil to retain its health as it decreases the potential of the soil to grow crop yield.[10]

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[8] Serpil savci, *An agricultural pollutant: chemical fertilizer*, 3 INT. J. ENVIRON. SCI. DEV, 77-80 (2012).
[9]Jelena Dragičević, *GLOBAL NITRATE WATER POLLUTION: LESSONS FROM NEBRASKA'S PLATTE RIVER VALLEY AND BEYOND*, 41 HARVARD INT. REV., 63–67 (2020).
[10] Jafar Massah & Behzad Azadegan, *Effect of Chemical Fertilizers on Soil Compaction and Degradation*, 47 AMA - AGR MECH ASIA AF, 44-50 (2016).

Loss of soil friability is a common hazard associated with the over application of unnecessary fertilizers to the soil. The presence of various acids in the fertilizers such as sulphuric acid and hydrochloric acid has a damaging effect on the soil. It totally degrades the soil structure. These acids dissolve the soil crumbs which aid in holding the soil matter together. These soil crumbs are a result of decayed organic matter such as humus and dried leaves which combine with the clay from the soil making it highly desirable for agriculture. These crumbs help in the soil drainage and also aid in the aeration of the soil. Since, these are destroyed by the fertilizers; it results in highly compacted soil which does not have its original yield production capacity. Chemical leaf scorch is another common damage caused to plants due to the over application of fertilizers. The leaves turn brown and yellow due to the excessive content of nitrogen in the fertilizers. This causes the plants to wither and die away. Mineral depletion and soil acidification are some other problems faced due to the over application of fertilizers. There is a depletion of the organic matter in the soil as a result of the overpowering chemical components of the fertilizers which degrades the soil quality.[11]

The best alternative available to curb the damages caused by the excessive use of fertilizers is the usage of the organic fertilizers better known as manure. These manures help the soil in increasing its quality as they aid the microbial activity in the soil keeping the soil fertile. Organic fertilizers are derived from natural sources like poultry, vermicomposting and livestock which make them the better option to increase yield in the agricultural lands. The past few decades have seen a rise in the usage of chemical fertilizers with their increased availability since the 1970s. This was mainly due to the increased demand for food and to get higher yield in a short period of time, the usage of the chemical fertilizers increased. The negative effects of the acidifying nitrogen components disturb the nitrogen cycles in the soil thus impacting soil health. Microbial community structure, microbial biomass and microbial residues which aid soil health are negatively affected by the metal ions coming from the chemical fertilizers thus leading to soil compaction and soil degradation. The rhizosphere soil health and the pH levels of the soil are being disturbed due to the over application of chemical fertilizers and this is only the surface layer of the soil getting contaminated[12]. Later, this contamination percolates into the deeper layers of the soil.

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[11]Janet Hunt, *HARMFUL EFFECTS OF CHEMICAL FERTILIZERS*, https://www.hunker.com/12401292/harmful-effects-of-chemical-fertilizers.

[12] Lin, Weiwei et al., *The effects of chemical and organic fertilizer usage on rhizosphere soil in tea orchards*, 14, 5 e0217018 PLOS ONE, (2019), https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0217018.

The book "Research trends in Environment Sciences[13]" speaks about the highly dangerous effects that chemical fertilizers pose to environment. Environmental pollution is an underrated topic as we fail to witness the changes happening on a daily basis, but experts' research shows that the environment is degrading at a rapid level and this is the biggest problem that man needs to address.

The nutrients are applied to the soil only when either there is a necessity to apply certain nutrients to enhance the crop yield or when there is a deficiency of nutrients shown by the plant. This has to be closely monitored and cannot be taken for granted. The unscientific over application of the chemical fertilizers where it is not needed, leads to soil acidification. The cycling of these nutrients has to be done in a particular method which includes addition of the necessary inorganic nutrients along with the organic nutrients and keeping in mind the plant nutrient necessities. Due to the increasing demand for food, there is a failure to go through these complex procedures prompting the farmers to go for the easier application of chemical fertilizers in bulk to get better yield in a short period of time. Over a period of time this becomes deleterious to soil heath.[14]

The link between spatial planning and water pollution is highlighted in this article and one of the factors influencing water pollution is diffuse pollution from agricultural use. Spatial planning involves the designing of the land in such a way that the town is not polluting the environment. The development control process is a process by which the authorities can refuse or agree to certain developmental activity or establishments. For example, the establishment of industries. [15] The people living in the town should not have an adverse effect to the development of their own town.

The link between rural and urban food cycle is depicted in this chapter. The urban consumers and the rural suppliers are bound by the chain of water basins helping in cultivation of the crops, water footprints which gives an idea of the water quality and the food flows which are interpreted in terms of nutrients. In the long run the industrial effluents and fertilizers are ignored as pollutants, as they do not show immediate effects but we need to realise that these are the long term polluting agents who render the entire water cycle useless. Further to quote

[13] 2 RANDEEP KUMAR ET AL., THE IMPACT OF CHEMICAL FERTILIZERS ON OUR ENVIRONMENT AND ECOSYSTEM, 69 – 86 (2019).
[14] 8 JOHN L. HAVLIN ET AL., SOIL FERTILITY AND FERTILIZERS: AN INTRODUCTION TO NUTRIENT MANAGEMENT (Pearson Education India 2016).
[15] Jeremy G. Carter, *Spatial Planning, Water and the Water Framework Directive: Insights from Theory and Practice*, 173 Geogr J., 330-342 (2007).

the example of Ghana, the nitrogen and phosphorous entering the country is lesser by 10% than the water leaving the country. And the treatment plants receive only 10% of the nutrients to be treated and reused.[16] This is a huge matter of concern as the fertilizers pose a threat due to over application and also in terms of absence of regular treatment before the water release into the water cycle.

In the "International Journal of Pure and Applied Mathematics[17]", it speaks about the different perspectives to using chemical fertilizers which are depleting the soil health and give the organic fertilizers as a solution as it gradually provides nutrients to the soil unlike the chemical fertilizers which break down the soil substructure and give rapid results in yield. This journal has the inputs given by the researchers from agricultural universities and experts in the field of agriculture. This supports the alternative solutions argument in my research and also gives statistical information about how the chemical fertilizer quantities were resulting in the depletion of the environment. The statistics help in giving a fair idea of how much environment is already depleted and how much more would surely be depleted due to the application of the fertilizers in the past few years.

In the journal article by Pallabi Mishra and Debiprasad Dash named "Rejuvenation of Bio fertilizer for Sustainable Agriculture and Economic Development"[18], they enhance the idea of using bio fertilizers for sustainable development. This goes on to prove the opposing attitude of the people towards chemical fertilizers as this article clearly mentions the areas in which these chemical fertilizers being used are resulting in overuse. They are causing excessive supply of nutrients, some of which are already present in the soil. This article helps in aiding the major component of why the fertilizers trade should be regulated in the country as it is of prime importance to start at the beginning point of trade rather than suffer after the sale is done by degrading the land.

Water eutrophication is a phenomenon caused by the pollution of water bodies due to fertilizers release into the water. The main chemical responsible for eutrophication is phosphate. The surface water should have less than 50 ug/litre, if it is in excess of this amount; it is dangerous

[16] PAY DRECHSEL & HANNA KARG, INTEGRATING FOOD INTO URBAN PLANNING, 154-170, YVES CABANNES AND CECILIA MAROCCHINO, (UCL Press London 2018).
[17] B Asvini et al., *Impact of using artificial fertilizer in soil*, 119 INT. J. PURE APPL. MATH., 47-55 (2018).
[18] Pallabi Mishra & D. Dash, *Rejuvenation of Bio-fertilizer for Sustainable Agriculture and Economic Development*, 11 CONSILIENCE: THE JOURNAL OF SUSTAINABLE DEVELOPMENT, 41-61 (2014).

to human health. Consumption of such polluted water leads to health risks such as gastric cancer, birth defects, goitre and heart diseases.[19]

The journal article "Sustainable agriculture and fertilizer use[20]" by Rajendra Prasad emphasizes the harm caused due to excessive use of fertilizers like nitrogen and how they have resulted in the degradation of the soil in various countries including Netherlands and a few. He says that India needs to learn lessons and use the fertilizers judiciously with respect to plant nutrients and soil health.

2) Case laws

In the case of Ram Chandra Mawa Lal and Ors v State of Uttar Pradesh[21], the contention was regarding the powers clashing between the state and the central government fixing the prices of fertilizers. The state government issued a notification which allowed the dealer to sell the essential commodity as per the essential commodities act at a higher price than the price as issued by the central government. So the appellants questioned their rights under article 14 and requested for a fair trial in terms of them being exploited. This judgement has complete binding value as a precedent in any Indian court as this judgement is given by the Supreme Court of India in an appeal from the High Court of Allahabad. It has persuasive and binding value on the lower courts. The majority judgement stated that the central government had the right to order a rule under two different acts and the state and centre can also make rules in consonance in the pretext of national integrity. When the centre keeps quiet on a matter, then the state has the right to make laws and they will be the final law. The dissenting opinion stated that the central government cannot be expected to make laws twice on a subject that has already been clarified. This case helps in proving the argument of how an exact number is needed on the regulation of trade by giving an example of prices which will vary with the quantity, so if the quantity is capped, so can the prices be.

In the case of Maharashtra state power generation company v Mahanadi coalfields ltd and Ors[22], in Para 123, it states that the independence of the Coal India limited (CIL) is not curbed as they can regulate the pricing and trade as and when they want. CIL supplied coal to regulated

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[19] 2 RANDEEP KUMAR ET AL., THE IMPACT OF CHEMICAL FERTILIZER ON OUR ENVRONMENT AND ECOSYSTEM, 69-86 (2019).

[20] Rajendra Prasad, *Sustainable Agriculture and Fertilizer Use*, 77 CURR. SCI., 38-43 (1999).

[21] Ram Chandra Mawa Lal and Ors v State of Uttar Pradesh and Ors, AIR 1984 SCR 2 (348).

[22] Maharashtra State Power Generation Company v Mahandi Coalfields ltd and Ors, (2017).

industries like electricity and fertilizers. Even though there is a policy in place there is no exact number mentioned where there is a stoppage on the trade and the independence is with the CIL who can change it according to their whims and fancies which creates a lot of confusion in respect to the other unregulated and regulated markets. The majority judgement stated that the power should be reasonably used but not arbitrarily and the dissenting judgement stated that the powers should not be given to an independent organisation. This paragraph in specific highlights the argument of market competition of raw materials to produce fertilizers.

In the case of Society for Preservation of Kasauli and its Environs Vs. State of Himachal Pradesh and Ors, the conflict of the residents of the Kasauli village to the town planning authorities building residencies was highlighted. The High Court of Himachal Pradesh ordered the appointment of a committee which would look into the water pollution caused by the construction and regulate the activities.[23]

In the case of S. Jagannath v Union of India[24], one of the contentions highlighted was with regard to fertilizer overuse which was the cause for depletion of the water quality in turn harming the shrimp population in the area. This happens as in the places where intensive shrimp farms are densely spaced waste laden water moves from pond to pond until it is finally discharged into the sea. As per reports only 10 tons of feed is used to produce 5 tons of shrimp, they are wondering where the 100 to 500 tons of sediment is coming from which is filled with the wastes like fertilizer residues. Section 7 and 8 of the environment protection act clearly prohibits any person who is carrying on industry, operation to discharge harmful environment pollutants above the limits prescribed.

There were several Suo Moto cases taken up by the National Human Rights Commission between the dates 01.01.2011 to 30.11.2011. One of the cases numbered 705/19/2/2011 speaks about the excessive use of fertilizers resulting from the unregulated trade which has led to various human health abnormalities such as cancer. Around 8 – 10 cases of cancer within a period of 10 years in Punjab were reported which is a huge number for a specific area. This case definitely has persuasive value in any court of law in India and can influence various decisions on human health affected by excessive use of fertilizers. It aids my research in the

[23] Society for Preservation of Kasauli and its Environs Vs. State of Himachal Pradesh and Ors, CWP No. 971 of 1993, 1994.
[24] S. Jagannath v Union of India, Writ petition (C) No. 561 of 1994, decided on 1996.

form of providing useful inputs regarding the statistics and names of the fertilizers and how the unregulated trade within a time period has affected human health.

This was also observed in the case of Fertilizers and Chemicals Travancore Ltd. Employees Association and Ors V Law Society of India and Ors,[25] where ammonia was the raw material used to produce various chemicals like urea, ammonium sulphate and ammonium chloride and they accounted for 4% of the fertilizer production. They had a history of leaks from the industry which had led to health problems of the people around and also deaths in certain cases.

In the case of Baljit Singh Malik Vs. Delhi Golf Club and Ors[26], the petitioners contended that the excessive use of fertilizers in maintaining the golf course was resulting in the contamination of the subsoil and the underground water, the judgement held the contrary as the respondents proved that they were not using any harmful fertilizers. However this case holds importance in my research as to how the excessive use of fertilizers can happen in commercial recreational activities as well. It is well known by now that excessive use of fertilizers can alter the soil structure to its detriment.

In the case of Indian Oil Corporation Ltd. Vs. Commissioner of Central Excise, Vadodara [Along with Civil Appeal No. 8048 of 2004], gave certain restrictions and ways in which the fertilizers could not be used under any exceptions even for trade. It is a Supreme Court judgement and has persuasive and binding value on any court of law in India. This case adds on to my research in a way to justify why certain fertilizers need to be capped and what could be the mechanism to do the same.

In the case of Punjab State Co-operative Supply and Marketing Federation Ltd. vs. Commissioner of Income Tax[27], the registrar was given the authority to regulate the sale and purchase of the fertilizers. The researcher seeks to highlights this very point as to how the absence of exact numbers leads to an ambiguity in what are the permissible limits. Every person or authority would deem a different number to be appropriate and this would bring about concerns in other states with regard to their permissible limits. So if specific numbers are specified it would help in settling matters for all authorities in charge.

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[25] Fertilizers and Chemicals Travancore Ltd. Employees Association and Ors V Law Society of India and Ors, appeal (civil) 1769 of 1994.
[26] Baljit Singh Malik Vs. Delhi Golf Club and Ors, 1998.
[27] Punjab State Co-operative Supply and Marketing Federation Ltd. vs. Commissioner of Income Tax, (1981) 128 ITR 189 P H.

In the case of Dr. Ashok Kumar v Union of India[28], it speaks about how fertilizers were used as a means to increase agricultural production but in turn the use of these pesticides and insecticides resulted in depleting the soil health. The fertilizers are also at par with these pesticides as fertilizers directly harm the soil and my research aims at bringing about reports that prove that the over application of fertilizers since time immemorial has resulted in the depletion of soil health and a major reason for this is the unregulated trade of fertilizers with an absence of a quantity cap on the sale and purchase of fertilizers.

3) Legislations and Regulations

According to the Schedule I of the Fertilizer control order , 1985, there are various combinations and quantities which are a minimum requirement to be present in a mixture or an individual fertilizer, which if not abided by will lead to penalties. This gives an indication of how much element needs to be present and not the entire bag of the fertilizer. For example, if one bag of urea is being purchased this schedule provides for the amount of nitrogen, biuret and moisture to be present in urea but nowhere does it mention the quantity of urea that can be sold and nowhere is the cap mentioned. Under rule 22, the manufacturers are allowed to sell any amount of bulk fertilizers to the retailer which is the core issue at hand. This unregulated sphere in the industry is creating a lot of chaos in terms of environmental degradation. This would be approved by the central government and the only requirement specified is that of the disclosure of the minimum plant nutrients to be present in the soil by the farmers to the manufacturer and the permission by the central government would be provided to the manufacturers to sell in bulk. The manufacturers can sell whatever quantity they wish to with the approval of the central government.

The national environmental policy of 2006 suggested in clause 5.2.5 which discusses preserving freshwater resources. Sub clause (ii) speaks about the groundwater which is one of the major source of freshwater in the country. It states under provision ( j ) that the excessive use of the fertilizers, pesticides and insecticides has to be stopped as they are the major source of polluting the underground water. They tend to pollute more in case of the agricultural output. They say that these fertilizers pollute the underground as well as the surface water. They promote the optional usage of fertilizer to improve the quality of the water. This proves that that although there is a mention of alternative usage of these fertilizers in practice it is not followed as the regulatory mechanism is not in place. It is acknowledged as a polluter but there

[28] Dr. Ashok Kumar v Union of India, 1988 SCR (2) 800.

is no step taken to regulate and cap the trade of these excessive and unnecessary fertilizers in the country.[29]

Sub clause 2 of clause 13 in the fertilizer control order speaks about the fertilizer mixtures meeting the standards set by the state government and the explanation to this section omits the liquid fertilizers containing N, P and K. this crops the issue of the standards of these fertilizers not being monitored regularly and these three components are vital to the production of any fertilizer in the country.[30]

The unregulated trade of these fertilizers results in the overuse of the fertilizers by certain farmers which in turn is depleting the components of the environment, one of them being underground water. As per Section 2(e) of the Water Prevention and Control of Pollution Act, 1974 (further referred to as the water act) defines the word pollution as any physical, chemical or biological change in the structure of the water due to any solid, liquid or gaseous material.

Rule 20 also provides for the central government to decide on the amount of imported fertilizers to be allowed in the country. There is an absence of a specified amount allowed in terms of any fertilizer as a standard measurement which is the biggest issue in terms of the sale of the fertilizers as the sale is happening in varied quantities around the country in desired amounts by the parties which ultimately results in the farmers employing more amount of fertilizers for the faster growth of the crops which over time results in degradation of the soil and the soil is of no use any more as the nutrients are all dissolved.

These laws deal with the import trade control and highlight the situation of Indian trade into the country which is also not regulated. As mentioned above the discretion is with the central government and there is an absence as to what is the exact number which if provided can stop majority of the unregulated trading in the first place. They add a new angle to the research in terms of the importing of fertilizers also to be controlled as there are a variety of fertilizers which our country imports in case of emergencies and scarcity.

Article 21 of the Indian constitution provides the right to life to every citizen as a fundamental right. The ambit of this article includes the right to a clean environment which is essential for

[29] National environment policy, 2006, approved by the Union cabinet on May 18, 2006 (India).
[30] Fertilizer control order, 1985, powers conferred by the Essential Commodities Act, 1955, No. 10 of 1955, Acts of Parliament, 1955 (India).

the citizens to survive. As discussed in various case laws, like M.C Mehta v Union of India, right to a clean environment is a part of article 21.

The directive principles of state policy provided in the Indian constitution are not enforceable in the court of law but are surely guidelines which need to be adhered to. Article 48 provides for the state to organise the agriculture on modern and scientific lines and Article 48 A provides for protecting the environment. Article 51 A (g) provides for the state to conserve the lakes and rivers from pollution and preserve them. These articles hold importance in my study for upholding the duty of the state in protecting the environment and in the issue at hand it is by regulating the trade of fertilizers and providing for a quantity cap which would act as a standard measure in all the trade.

Rule 27 and 28 deal with the appointment of inspectors who are individually responsible for maintaining quality control measures and regulation of trade but instead there should be an expert body who would be having defined powers of solely regulating the quantity being traded and look into violations.

4) International perspectives

A report by the US aid for the American people and enabling agricultural trade on regional trade on seed, fertilizer and strategic grains[31] shows the various legal and regulatory aspects of trade of fertilizers in various South East Asian countries with reference to factors like fertilizer pricing and government regulation. The report says that countries like Nepal, Bangladesh and India rely on importing certain fertilizers which are extremely essential for agricultural growth. They speak about the excessive use of fertilizers resulting from market distortions and how the governments can focus their policies towards this issue and control soil imbalances in the country. It also speaks about how the subsidising of certain fertilizers has led to a decrease in demand for other fertilizers essential for agricultural produce. This helps in my research as it gives information regarding how the regulations can be imposed to control market fluctuations between the government and the private players in the market and emphasizes the need to have a definite and specific amount which can be traded with the domestic players or on an international level which is missing presently.

[31] Enabling agricultural trade, *Regional Trade in seed, fertilizer and strategic grains: A Review of the Legal, Regulatory and Institutional Constraints to Growth across South Asia*, (April 2014), https://cuts-citee.org/pdf/EAT_SouthAsia_Report_041514_web.pdf.

Town planning is a concept which started growing since the World War I when people like Radhakamal Mukherjee, an Indian sociologist and Geddes came together to introduce a concept called urban ecology. He said that the ecological and social aspects of living have to be balanced together otherwise there would be total chaos, for example the integration of rural and urban towns. They discussed about the rooting and uprooting of man's activities, rooting was the lifestyle one was used to in the rural areas, uprooting was the new lifestyle he would adapt to in the urban areas. This influenced his social living characteristics.[32] Similarly the agricultural activities being carried out as a result of the rooting and uprooting system explained above is polluting the water resources around the country and resulting in overall pollution. The town planning efforts need to cater to this aspect of shift of population from the rural to the urban areas.

On an International level, with regard to the intensive use of fertilizers, the Food and Agricultural Organisation (FAO) has released a soils bulletin which focuses on how the fertilizer residues and the excessive use is leading to the change in the soil structures. This report does not have a direct link to India but it does acknowledge the threat of excessive use of fertilizers.

The comparative analysis can be made with the regulations of fertilizers in the laws of republic of Montenegro. Articles 24 – 32 describe in detail about how the import of the fertilizers needs to be regulated. It can be a model that can be adopted in drafting regulatory laws in our country too. The food and agricultural organisation has an international code of conduct for the management and sustainable use of fertilizers in which it provides for the regulations to use of fertilizers should be done to protect the environment. The world trade organisation adopted the laws on fertilizers which are published in the official gazette of the republic of Montenegro as discussed earlier and follow the same guidelines.

Conclusion

Smart city development involves various processes and the environment plays a crucial role in this. The components affecting the degradation of environment become important as they reveal the true change that needs to be introduced. Land and water degradation due to the smart city development and being a hindrance to smart cities development is one such factor.

[32] 39 WILLIAM J. GLOVER, URBAN HISTORY, 108-127 (Cambridge University Press 2012).

The activities of town planning can result in water pollution but the impact of pollution on town planning is often neglected. All the efforts of town planning are in vain if the pollution is affecting the people for whom the infrastructure is being improved. Also, the pollution results in destruction of the lands and water sources which are key in developmental projects. Hence, rejuvenation of the polluted land and water along with prevention of the pollution is necessary.