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## WATCH YOUR WASTE

### Abstract

Today, India faces an issue of over consumption due to the growing prosperity of the middle class. Production and consumption patterns based on the industrial economy have led to generation of a large amount of waste and the accompanying problem of its disposal.

In this paper, we aim to examine the issue of food and water wastage and provide practical solutions to reduce it. Attitudes towards wastage are divided - people are aware of the gravity of the issue but only a minority act on it. Food and water are taken for granted and used liberally by the middle and upper classes of society, while the rest of India languishes due to the lack of it. Thus, we believe, wastage is mainly a problem of awareness and of attitude.

We will be focusing on the issue of wastage in our community, the Rishi Valley Education Centre (RVEC). Rishi Valley located in Chittoor District of Andhra Pradesh State is a drought-prone area, situated on the edge of the Deccan Plateau. The school campus comprises 350 acres and is surrounded by villages where the main occupation is agriculture. The school in particular prioritizes issues like controlling litter, conserving water, food and other materials. Despite our best efforts, wastage continues because students and staff do not seem to understand the inter linkages of food wastage to a valuable resource- water!

In this paper, we look at the cycle of food and water usage in the school and propose to reduce wastage through different methods. A principal one would be that of incorporating appealing incentives into daily lives. As a majority of people do not have moral incentives to reduce their wastage, perhaps providing them with external incentives will encourage them to do so. This program of incentives can be implemented in communities of similar size (factory towns, boarding schools/colleges, hospitals, ashrams, gated communities etc.) that number in the thousands across India. While the kinds of incentives provided will be specific to a particular community (for example, at RVS the hostel that uses the least water might get to go for a 'house hike') the general idea could have broad appeal.

Along with incentives, we believe that cultivating responsibility and ownership towards this issue will go a long way towards reducing waste. For this purpose, awareness of the extent of waste around the country needs to be spread, especially amongst children. Combining this with the use of appropriate technology for water usage and food preparation and its disposal will provide a better solution than traditional approaches of fines and deterrents. We think by applying these solutions in a community like Rishi Valley as well as other communities across India, wastage could be cut down a great deal leading to conservation and efficient use of our resources.

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## 1.0 Overview of Global Food Wastage

An alarming **one-third of all food produced** in the world **ends up in the waste dumps every year**. This astronomic amount of food wastage means that the resources used up and greenhouse gases emitted during the production, transportation and distribution of food are all in vain. Food is a key driver of climate change. How our food gets produced and how it ends up on our tables, accounts for around half of all human-generated greenhouse gas emissions. A recent study by GRAIN<sup>1</sup> reports that the current global food system, fuelled by an increasingly powerful transnational food industry, is responsible for anywhere between 44% to 57% of all human produced greenhouse gas emissions. Details of this are shown in Table 1 [1].

**Table 1 – Food and Climate Change [1]**  
*The industrial food system is responsible for 44-57% of all global GHG emissions*

S.No.	Sources of Greenhouse Gas Emissions	% of all Greenhouse Gas Emissions
1	Agricultural Production	11-15
2	Land use change & Deforestation for Agriculture	15-18
3	Processing transport, packing and retail	15-20
4	Waste	2-4
5	Other non-food related emissions	43-56

According to a recent study by the Food and Agriculture Organisation (FAO), the food wastage we speak of approaches a staggering 1.3 billion tons per year [2]. There are many stages of the food supply chain - the main ones being production, storage and distribution and consumption. It has been observed that the extent of wastage differs from high income countries to low income ones. Forty percent of

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1 GRAIN is a small international non-profit organisation that works to support small farmers and social movements in their struggles for community-controlled and biodiversity-based food systems.

food losses in the latter occur after harvesting or through processing while in the former, more than 40% of wastage occurs at retail and consumer levels.

It is ironic that despite their affluence and environmental consciousness, there is a greater instance of wasting in high income countries. It seems that in such areas, surplus of food and a nonchalant public attitude lead to an inordinate amount of wastage. The thought in everyone's mind seems to be *'If I can afford to waste it, why not?'* Buy-one-get-one-free offers and ready-made packets of meals do not help the situation either. Hence, the market heavily promotes wastage. In countries with a high poverty rate [India included] the chief cause of wastage seems to be poor infrastructure, transportation and storage methods.

Today, paradoxically India faces food wastage at both ends of the food supply chain. Production and consumption patterns based on the industrial economy lead to generation of a large amount of waste and the accompanying problem of its disposal. Lack of adequate or proper storage facilities is resulting in rotting of foodgrains. The government has acknowledged that the country wastes Rs 58,000 crore worth of food items every year due to lack of or poor storage facilities [3]. At the consumption end, it has been estimated in April 2011 that in Indian weddings 15-20% of the food cooked is wasted. The Food and Consumer Affairs Ministry is therefore meeting to discuss steps for reducing food wastage at weddings and social gatherings [4].

In the words of Rahul Goswami, an agriculture systems researcher based in Goa, “From the mid-term appraisal of the Eleventh Five Year Plan onwards, Central Government ministries have been telling us that post-harvest losses in India are high, particularly for fruits and vegetables. The amount of waste often quoted is up to 40% for vegetables and fruits, and has been held up as the most compelling reason to permit a flood of investment in the new sector of agricultural logistics, to allow the creation of huge food processing zones, and to link all these to retail food structures in urban markets. The urban orientation of such an approach ignores the integrated and organic farming approach, as it does the evidence that sophistication in food processing has not in the West prevented food loss or waste.”[5]

In this paper, while we examine the issue of food wastage we will be discussing our attempt at using an “integrated organic farming approach” to reduce wastage during production. We also aim to examine the issue of food wastage and its linkage to our most precious resource – water – and provide practical solutions to reduce this wastage. Attitudes towards wastage are divided – most people are not aware of the seriousness of the issue and even if are, only a minority act on it. While the focus of our paper is food wastage, it is also an indirect commentary on water wastage since water is an integral part of food production, storage, transportation and processing. **So, every time food is wasted, all the water that went into its production, storage, transportation and processing, is also wasted, not to mention the greenhouse gases released in the associated processes.**

Food and water are taken for granted and used liberally by the middle and upper classes of society, while the rest of India languishes due to the lack of it. Thus, we believe, **wastage is mainly a problem of awareness as well as attitude.**

Our intention at RVEC is to narrow down the waste level to **zero wastage**. The reasons we wish to eliminate wastage are the interlinked impacts it has on other natural resources mentioned above and therefore on the lives and livelihoods of the surrounding community with whom we share these resources. Needless to say, a more pressing reason is to reduce **our carbon footprint**.

## 2.0 Overview of RVEC

In our paper, we will be focusing on the issue of wastage in our community, RVEC, and attempting to provide some suggestions on how this can be minimised to reach the target of **zero wastage**.

RVEC is located in the Chittoor District of the Rayalseema region of Andhra Pradesh. It is a drought prone area, with water being our most precious resource. The school campus comprises 350 acres and is surrounded by villages where the main sources of livelihood are agriculture and pastoralism.

The total staff and students of the school amount to about 600. The vast campus includes a vegetable garden, a dairy as well as an organic farm estate which grows healthy crops like various millets, sugar cane, etc.

RVEC prioritizes resource conservation and issues like controlling litter, conserving water, food and other materials. Despite our best efforts, wastage continues because **people do not seem to understand the close connection between food and a pivotal resource - water!** In this paper, we look at the food cycle in the school and propose to reduce its footprint through different methods.

### 2.1 The Food Supply Chain in RVEC

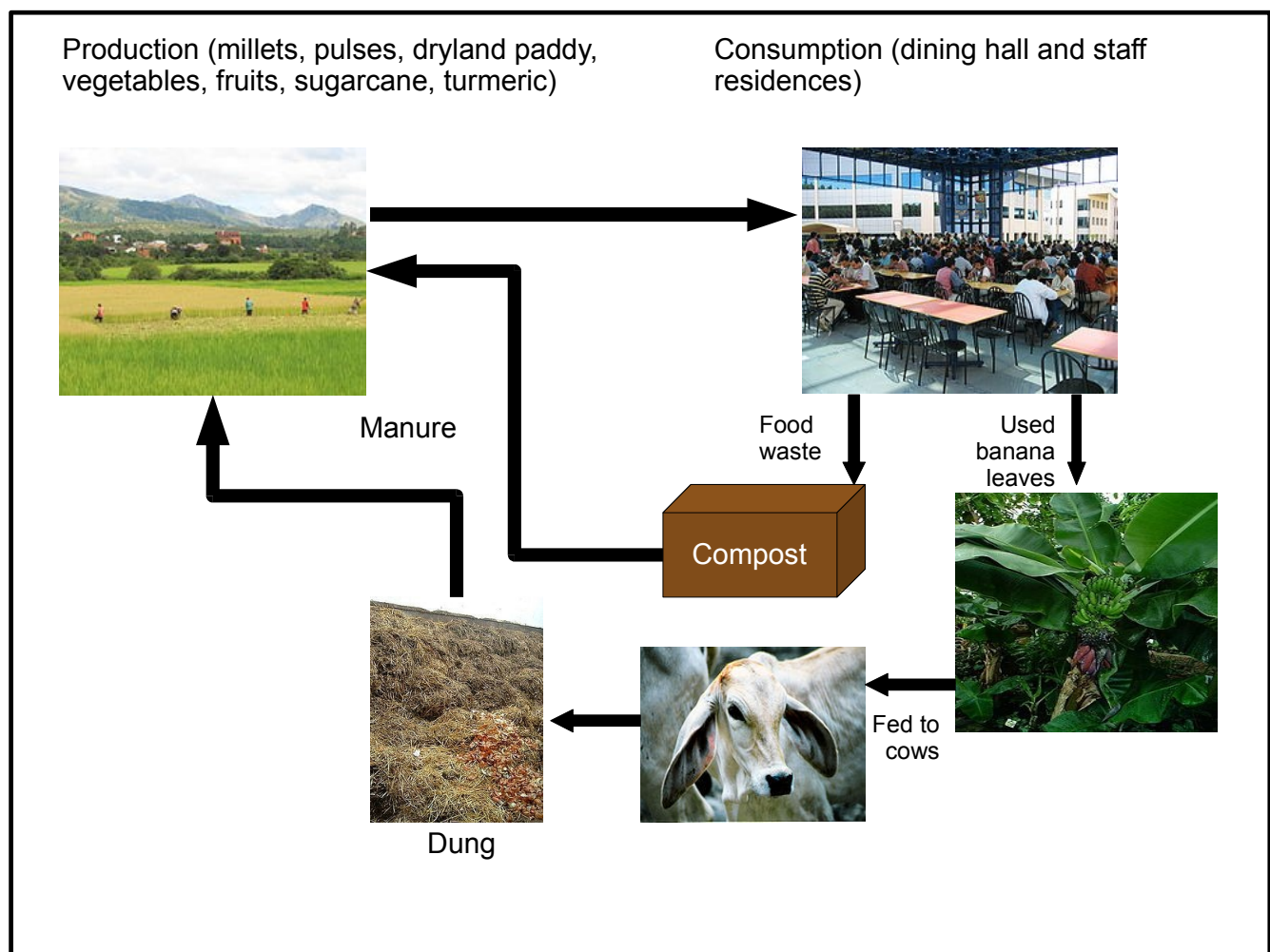


Figure 1 – Food Cycle in RVEC

## **Food Production and Procurement**

Despite being a relatively self sufficient campus, our food miles - the distance we need to go out of our boundaries to get grains, vegetables, fruits, milk and milk products, spices etc. - extends about 75 km to Kadri in the west, 167 km to Bengaluru in the south west and about 130 km to Tirupati and approximately 400 km to Sittilingi in the South. Relying solely on local crops might increase self sufficiency, but would not meet the demands of a diverse and nutritious diet. There is a thriving vegetable garden in the campus that produces 60% of what we consume but certain essentials like rice, milk, butter, potatoes and spices can only be obtained from outside[6]. Some seasonal items are also bought from outside. We would like to reduce this food mile since there is a lot of wastage of resources while packaging and transporting. Our carbon footprint can be reduced if we bought more local products. Since 2009, we have started working with local farmers to move them away from chemical based farming and towards organic farming. About six farmers who have begun to produce organic vegetables are now our suppliers but this number needs to be increased.

The RVEC Estate also contributes to our food supply chain. Crops grown on the estate are mango, coconut, sapota, banana, ragi, horse gram, field bean, jowar, dry land papaya and groundnut[7]. The school promotes sustainable farming practices in the Estate and Vegetable Garden thereby eliminating usage of pesticides and chemical fertilizers. Natural soil conditioners and pest-repellants are used to manage the crops. This greatly reduces food wastage at the production stage.

## **2.2 The Water Situation in the Context of Food Production and Consumption**

In the entire campus eighty to ninety thousand litres of water are used per day - including the water used in the dining hall, hostels and other human needs. Cleaning the floors of the dining hall, kitchen and washing the utensils three times a day takes up approximately five hundred litres per day. Our drinking water is obtained by treating groundwater, extracted through a borewell, using reverse osmosis. Through our conversation with the Vegetable Garden Manager we understood that drip irrigation had been implemented earlier this year to make water usage in agriculture efficient. By this method, only necessary water is used. Everyday water is pumped for about 6 to 7 hours for the vegetable garden. To provide the garden with water, two bore wells have been installed, but only one is used. Although water intensive crops like sugarcane and turmeric are grown to reduce our food miles for these products, by using water conservation techniques such as drip irrigation and agroecological practices we are able to produce them in a sustainable manner. Composting and mulching is used to reduce water loss which happens due to evaporation [8].

Agriculture in RVEC is primarily rain-fed with a focus on dry-land crops such as millets and dryland paddy. According to RVEC Estate Manager, the amount of water supplied to crops by rain is about 60 cm in four months - it provides an acre of land with 1100 cubic metres water. Sugarcane, an annual crop, takes one year to be ready for harvest and requires about 3780 cubic metres of water for 1.5 acres. With six months of good rain, no extra water is needed [7].

Conscious decisions made to grow dryland paddy and indigenous varieties of millets and vegetables and their integration into our diet contributes to improving our health and nutrition while resulting in water conservation. Growing these crops on RVEC campus also serves as a **seed bank** for the surrounding community which allows for an improvement in local food and water security. **This self sufficiency not only contributes to the local economy but also reduces our food mile.**

## **Food Consumption**

The cooked food leftover from the dining hall is distributed among the workers who live around our

campus. The waste dumped in the buckets after each meal is emptied into a pit behind the dining hall. Used banana leaves are given as feed to the indigenous breeds of cattle maintained and conserved by the school which in turn provide manure for agriculture [9].

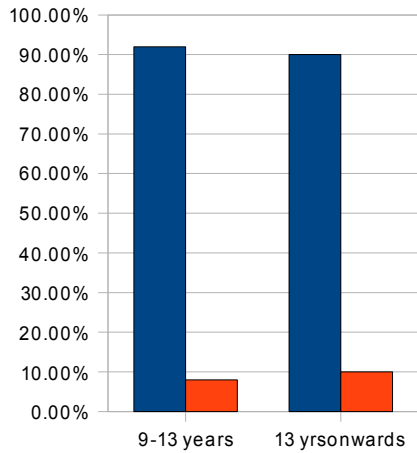
### 2.3 Analysis of the Wastage

With a minor level of wastage in production, storage and distribution, we observed that **most of the food wastage in Rishi Valley happens at the consumption level – that is – at meal times in the dining hall.** The dining hall itself does not waste much because all extra food that is left unserved is given to workers to take home. Hence, there is minimum wastage at the distribution level. However, a fair amount of food is wasted everyday in waste buckets by people eating in the dining hall and this organic waste is then dumped in a compost pit behind the kitchen. So the question arises: **Why do people waste?** To answer this question and a few others, we conducted a survey using a few specific questions on food and water wastage. These questions were put to 100 random people including students, teachers and visitors at meal time in the dining hall. The results of the survey are presented below in **Figure 2 a, b and c.**

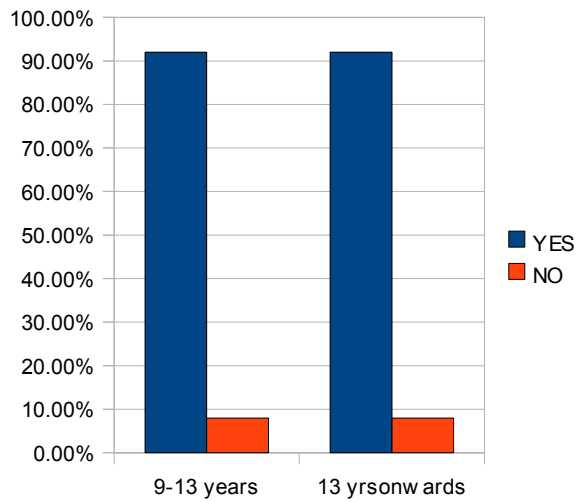
Through our survey we found that **wastage at RVEC is largely a problem of attitude and awareness.** Most people are unaware of how important an issue wastage is and why. Even if they are aware of it, they assume that **wasting is not a big problem at a personal level.** Some people were wasting food because they didn't like certain food items which were made compulsory as they are essential for health. It was found that with students in the age group of 14 and above, they often overestimated the amount of food they could eat, resulting in wastage of the excess food that they had served themselves. With the younger students (ages 9 to 13) a minimal amount of food is pre-served and they are expected to eat whatever is served on their plates. This results in wastage of food that they do not like or food that they are not able to finish.

However, most of the wastage we found was because people did not realise that wastage is an issue and even if they did, they thought that their individual wastage was not of much consequence. Rishi Valley's wastage may not be very high, but, since we have a target of **zero wastage**, we will need to find solutions to these problems.

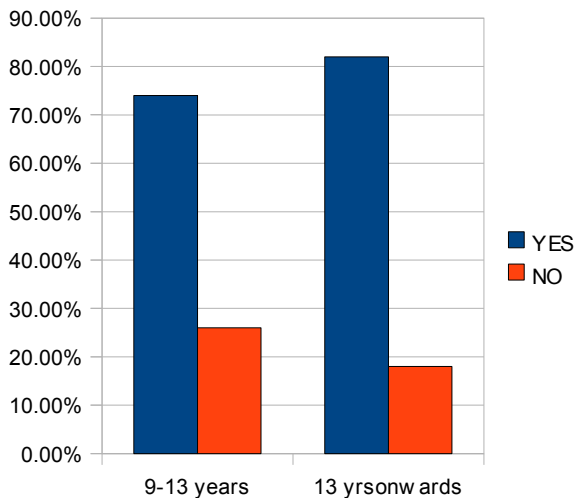
**Figure 2 a): Do you think there is wastage of food in Rishi Valley School?**



**Figure 2 b): Do you think there is wastage of water in Rishi Valley School?**



**Figure 2 c): Do you waste because you think wasting at an individual level does not really matter?**



### 3.0 Attaining Zero Wastage – Our Current Situation

Living in an environmentally conscious campus the students of RVEC, have taken quite a few steps to reduce food wastage. We have an ongoing programme called “Campus Carpet Cleaning”. Teams of students go around the hostels and classes with large sacks to collect litter, and then dispose it in our campus garbage dump.

As a part of “Getting Our Hands Dirty!” students participate in field work clearing water channels to improve rainwater harvesting, contour trenching to enhance soil moisture and planting local indigenous varieties of plants. Students go around the campus with buckets to collect organic waste from different hostels and residence. They then feed this organic waste into compost pits located all around the campus. Students also do deweeding in the vegetable garden.

Some students work on building check dams to improve percolation. As we are in a drought prone area, the check dams not only help in holding the rain water for the school but also leads to recharging of groundwater which RVEC and the community share. The channels help in directing the water to the check dams.

Local fodder, fuel, fruit and medicinal plants are being planted on a regular basis on RVEC land, near the channels to hold the soil, improve local biodiversity and provide support to the local community's livelihood needs – **using a private resource for the common good!** Trees like the subabul are being replaced by trees native to this region in order preserve them. But more importantly these trees would use less water and have a livelihood significance for the surrounding community.

In the Dining Hall, banana leaves are now used instead of plates because it saves on water which would have been used for washing. They are also easily disposable and bio-degradable [9].

Awareness is created through posters which are being made by the junior classes concerning threatening environmental issues like Global Warming, Conservation of Water, etc. These issues are also frequently talked about in assemblies increasing the awareness among the students.

As our survey elaborated, it is the attitude to wastage which is the main cause of continued wastage of food. One would have to reduce wastage at the consumption level to attain zero wastage. We are not too far from cutting down our waste to zero, and with the help of the solutions listed below we could get close.

### 4.0 Suggested Solutions

We came up with some simple, but effective solutions for the issue of wastage of food and water in RVEC. We have not implemented these solutions yet but are planning to do so with the help of staff and authorities in school. As students, we know how other students think and what will be effective in inducing them to cut down on their wastage. Our solutions are specific to the school's situation. However, since we have used Rishi Valley as a pilot and prototype for India, the essence of the ideas are applicable to the rest of the country.

The solutions can be divided into three main categories - (A) providing external incentives to promote zero wastage (B) spreading awareness on the issue, its effects and possible solutions and (C) on ground measures.

**A) External Incentives:** Since the majority of people do not seem to realise that they have moral and practical incentives to reduce their wastage, incorporating external incentives into their daily lives may encourage them to do so. Some external incentives include:

Rationing – to prevent the wastage of water, water can be rationed to a certain quota per hostel in a given time. For example, each hostel may be allowed a certain number of litres of water per week or per month. This quota should be well enough for all needs such as bathing, washing, etc. Drinking water can be supplied separately from the quota. This will prevent students from wasting away water in unnecessary things such as 'water fights', or using it lavishly by leaving the tap on while brushing their teeth. The incentive is that if the student then uses water frugally, they will be rewarded with a treat that appeals to them. For example, if a hostel's water usage is within the given quota, the hostel ward will take them on a 'house hike' or they will be treated to a special meal. This idea of providing incentives could be generalized to other communities (apartments, factory campuses, hospitals etc.) with the incentive being specific to each location.

Supervision of Eating Habits – To prevent the wastage of food at meal times, strict supervision in the dining hall can be introduced. This will prevent students from wasting food as well as introduce the seriousness of the matter. It will also make them serve themselves with more thought and improve their estimations of how much they need, as they will have to finish what is on their plate. Though this is an external incentive, in the long run, it will build habits that will last the students their life time – the habit of treating food with respect and giving it its due value. This has been implemented at meal times of the junior school and has been successful in greatly reducing wastage.

**B) Promoting Awareness:** In a place like Rishi Valley School, people are aware of the calamities of food and water wastage. As mentioned before, the wastage here is a matter of awareness as well as flawed attitudes. Solutions for these two problems are:

- People should be given the bigger picture of how food production is closely interlinked with water conservation and the issue of climate change. This will create a strong impression and emphasize the gravity of the issue.
- We should realise how our individual wastage contributes to the total bulk of food wastage. We should also realise that certain foods are made compulsory in our dining hall because they are essential for a wholesome diet and so should not be wasted.
- Students should take the initiative to seriously convince their peers especially younger children (who should be involved in field work). Unveiling a few more statistics of the rampant wastage would work wonders. For example, a revelation that around a fifth of food produced is thrown into bins, would drive the idea home.
- Students also need not shy away from making the consequences of wastage clear to visitors who are ignorant about its effects.
- In villages around our campus, the shortage of resources ensures that they are used sparingly. Villagers end up using most of their share of water for their agriculture while only a bucket is used per day for an entire family. However, when they come to the school campus, they tend to use unrestrained amounts of water, not knowing that we too have a scarcity of water. Reminding them of this could improve matters.
- Calling on prominent and popular local figures to spread the message worked in a campaign to save whales, and would probably do the same here.
- Spreading awareness need not be confined to just conversation but should also be done through cultural programmes like folk songs, tales and dances.

**C) On the Ground Measures:** Some other measures include:

- increasing purchase of food items particularly vegetables, grains etc. from our surrounding community once we have managed to make the agricultural practices more sustainable through our ongoing outreach programmes. This will not only reduce our food miles but also enhance local livelihood;
- ensuring that the poor quality fixtures such as taps, pipes and tanks are repaired and /or replaced where necessary;
- ensuring the composting of all the organic waste on campus. Although RVEC has an ongoing composting programme we need to ensure that all the houses on campus are covered;

## 5.0 Applications to India

The solutions we have provided can easily be applied to India- on a small scale, of course. For instance, usage of external incentives would be very effective if used in places like schools, universities, colleges and gated communities. A reward can be set for people who consume less than  $x$  litres of water per month. Schools can have supervision of students' eating habits to ensure there is no wastage. This reward can be anything from money donated by a concerned organisation or the Government to other desirable prizes. Rationing can be implemented in other boarding schools as well.

Awareness of the issue of food wastage can be spread in numerous ways. Restaurants and hotels can request customers not to waste. Schools, colonies and villages can have plays, presentations and competitions related to the issue. Advertisement companies can take up propagating the perils of wastage, ( this will probably change public mindset and also boost the company's reputation). Little things like these can go a long way.

The attitudes of people in school towards the issue of wastage are prevalent throughout the country at a larger level. Several people realise that overall food wastage is an issue but they think that their individual wastage of food is insignificant. This adds up to the colossal amount of wastage that is happening in the country already.

## 6.0 Critical Summary

This essay focused on food wastage, highlighted the linkage between food and water and between food, water and local communities. For a *drought prone* areas like ours, it is crucial to realise these strong interdependencies, so that we are conscious of how we manage our food and in turn conserve water. We have chosen simple solutions rather than technological ones as working with human attitudes is critical to changing the way we consume as a people. We have to make changes in our consumption patterns if we want to reduce our carbon and ecological footprint. Technological solutions can only take us half way. By applying the concept of our solutions to other communities, we think it would greatly help reduce our country's carbon footprint.

Though attaining zero wastage is a long way away, starting off with these simple things would get India on the path of seriously watching our waste and therefore reducing the food insecurity in our country. These measures of rationing, supervision, incentives and propagating awareness are applicable to every educational institute in India- from pre-schools to universities. If wastage can be obliterated during each stage – production (including distribution, storage and transportation), and consumption, the holy grail of zero wastage will be obtained.

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