



terra source

a green solution to poverty



EXECUTIVE SUMMARY

It is a confounding question, in a time of such wealth and affluence in the developed world, why have we failed to eradicate poverty? The cycle of poverty will not end unless the world changes its perception of the poor.

India is the second most populous nation, however its limited supply of underground and surface freshwater is quickly dwindling. Exacerbating this problem is the rapid urbanisation of the country, which is fueled by new factories that depend on water as part of the manufacturing process. Every day the textile industry in India illegally deposits millions of liters of chemically saturated water into dry riverbeds. Once in the soil the water drains to underground wells and city residents eventually consume this tainted water supply.

Meanwhile, farmer's crops are dying because they can't afford to pay the private water rates to water their crops. Families are sentenced to a life of poverty and children are born into a world of subsistence with little hope for growth.

Terra Source is conceptualized on three fundamental principles as outlined in our comprehensive business plan:

1. To create a method for industry leaders to dispose of waste water without harming the environment and future generations,
2. To provide farmers and their families more revenue by boosting crop yields by over 500%, and
3. To create entrepreneurial opportunities, allowing subsistence farmers to become global citizens with the ability to move forward.

Focusing on the two major crops in Tamil Nadu, cotton and rubber plants, Terra Source will be a global leader in providing the 4 billion people in the world making under \$1500.00 per annum with *a green solution to poverty*.

Best regards,

The Terra Source Team

(Emma White, Vivian Kwong, Ray Lam, Ivan Merilo, Kaidi Peetersoo, Nathalia Velez, Pedro Peroni)



TABLE OF CONTENTS

1 - Market Analysis	1
1.1 Customer Analysis, <i>pg 1</i>	
1.2 Environment Analysis, <i>pg 1</i>	
1.3 Industry, <i>pg 1</i>	
1.4 Competitor, <i>pg 2</i>	
2 - Business Solution	2
2.1 Water treatment, <i>pg 2</i>	
2.2 Agricultural services, <i>pg 2</i>	
2.3 Direct sales and credit services, <i>pg 3</i>	
2.4 Growth and Expansion, <i>pg 3</i>	
2.5 Risks, <i>pg 3</i>	
3 - Operations and Finance	4
3.1 Revenue Structure, <i>pg 4</i>	
Pricing, <i>pg 4</i>	
Revenue, <i>pg 4</i>	
Direct Sales, <i>pg 5</i>	
3.2 Action Plan, <i>pg 5</i>	

Appendices

A – Land Market Size	(1 page)
B – Works Consulted	(1 page)

1 – MARKET ANALYSIS

1.1 CUSTOMER ANALYSIS

The majority of farmers in India are either subsistence farmers or landless labourers. It is estimated that 75% of India's 700 million farmers, own farmlands smaller than 5 acres in size. With such small sections of land it is virtually impossible to use farm equipment to achieve economies of scale when cultivating crops. Consequently, the majority of the farms in India are underutilising the land; critics argue that, "subsidies-such as "cheap" water, fertiliser, pesticides and credit" have resulted in farming techniques that are wasteful and ineffective¹.

The World Health Organization estimates that 85% of India's rural population depend on ground water². Water originating from underground wells and lakes is quickly depleting. The water subsidies allow farmers to purchase water at 1/9th the cost of industrial users. However, farmers are accumulating significant amounts of debt to pay for the drilling of new wells to reduce their dependency on private water companies. Farmers take on substantial risk for a chance at a good bumper crop, which is heavily dependent on favourable monsoon rains³. This is a problem since many environmental factors are causing erratic rainfall patterns. In Tamil Nadu the government is recording record rainfall in some areas while unexpected droughts are occurring in other regions. In one year the rainfall can drop or rise considerably, and seemingly without warning⁴, this makes it difficult for farmers to predict harvest yields.

1.2 ENVIRONMENT ANALYSIS

It is clear that farmers could benefit substantially from a dependable supply of water. It is estimated that 17% of the world's farmland is irrigated, but it produces 40% of the world's supply of food⁵. Irrigation greatly improves a farm's harvest; irrigated land value is estimated at \$625/ha/year versus \$95/ha/year for rain-fed crops and \$17.50/ha/year for rangeland crops. Despite the growth in irrigation in developing nations, the average cost of an irrigation system is still out of reach for most farmers in India. However, on average irrigation capital costs are about \$450,000 USD per square km, with some of the difficult lands in Africa costing between \$1,000,000 - \$2,000,000 USD. From these studies, we can conclude that although irrigation can increase the value of farmland by 500%, clearly irrigation is not an option for most Indian farmers.

Water is not only essential to agriculture—the burgeoning industry in India also requires an incredible amount of water. The t-shirt industry in Tirupur, Tamil Nadu has 115,000 kl of water delivered each day to its factories⁶. In comparison, the residents of Tirupur will receive a mere 26,000 kl each day.

1.3 INDUSTRY ANALYSIS

Although water treatment plants are available in India, many industrial factories are illegally dumping their wastewater in dry river beds. This chemically contaminated water seeps into the soil and eventually finds its way into the underground water supply to be pumped out and consumed by residents. India is beginning to reform its environmental practices by imposing fines and closing down non-complying factories.

¹ CIMMTY (2008)

² World Health Organisation India (2008)

³ Vaswani (2006)

⁴ Government of Tamil Nadu, 2006

⁵ Schoengold & Zilberman, 2001

⁶ Ninan, 2003



The cost for treating wastewater is a disincentive for factories; however, our business model reduces the expenses related to recycling water. With factories supplying Terra Source wastewater, industries can recycle their water for significantly less than the cost required by traditional waste treatment plants. Terra Source will cover the cost of capital, and each factory will cover the variable cost of transportation of wastewater and a reduced wastewater recycling fee.

1.4 COMPETITOR ANALYSIS

There are currently a variety of water treatment plants available in Tamil Nadu that supply water to farmers, industry and residents. However, the focus of private water companies is to provide water to industries⁷. Industrial factories are large consumers of water and pay a much higher premium for water. In effect, the farmers who have small plots of land are marginalised. Additionally, in order to provide water to a diverse range of customers, these water companies recycle water to a drinkable form, which is substantially more expensive than converting wastewater to partially reclaimed water. Partially reclaimed water has very specific uses and will only work with certain crops. In the market to provide water for farmers of industrial crops, there is little to no direct competition.

2 - BUSINESS SOLUTION

2.1 WATER TREATMENT

Wastewater typically costs \$0.30-\$0.40/kl to recycle, however, it is possible to reduce this rate and use partially reclaimed water for watering industrial crops such as cotton or rubber plants—which are regularly grown in Tamil Nadu and the neighbouring Kerala state. By reducing the requirement of water quality to partially reclaimed water, the savings can be passed on to factory owners. This will serve as an incentive to recycle wastewater instead of polluting the water supply.

2.2 AGRICULTURAL SERVICES

The US Department of Agriculture stated that, “Although India’s cotton area is the worlds largest, its yields have been among the world’s lowest.” Subsistence farmers are faced with many issues regarding: unreliable monsoon rainfall, no economies of scale, improper farming techniques, and mounting debt/interest costs.

The principle benefits of our service include:

- Increased crop yields from efficient distribution of water
- Partially reclaimed water at a fraction of subsidised water costs
- Insurance against unpredictable monsoon rain/drought
- Agricultural advice
- Access to agricultural farm equipment

Terra Source’s main service is to provide the necessary amount of water to allow industrial plants like cotton and rubber to flourish. Farmers choosing to partner with Terra Source will no longer be dependent on temperamental monsoon rains. For example, it is estimated that the average hectare of cotton requires 5,000 kl of water annually; this equates to 50cm of rainfall⁸. Monsoon rains normally provide about 30 cm of rainfall each season. However, the weather in this region is unpredictable and rainfall can vary by as much as 10 cms or 1000 kl/ha. This could be detrimental to farmers that depend on the harvest for the majority of their annual income.

⁷ Ninan, 2003

⁸ Organic Cotton Netherlands, 2005



Using a mobile sprinkler system attached to the water tanker and cab, we can distribute water evenly and efficiently. In order to overcome the issue of small plot sizes, Terra Source will contract out to a community of farmers and treat the community as one client. This will allow us to provide service at an economical price. As well, servicing a larger farmland will allow us to provide secondary services such as machinery to spread fertiliser or harvest crops.

2.3 DIRECT SALES AND CREDIT SERVICES

In order to provide a first-rate product to farmers, it is necessary to understand the nuances in cultural differences and the needs of Tamil Nadu residents. The direct sales approach utilised by Avon, Mary Kay and others has been gaining popularity in Russia, China and Brazil⁹ and has been effective in traditionally marginalised markets. These independent associates will be required to own a plot in the area being serviced by its customers. Associates working with Terra Source could be trained to provide agricultural guidance to local farmers and overcome cultural barriers. This would also generate new entrepreneurial opportunities in the region.

Terra Source will also provide service on credit, this will ensure that farmers who are unable to afford our services, will have a chance to improve their yearly crop yield. In addition, the risk of defaulting on service lease agreements can be reduced by having the associates judge the credit worthiness of their neighbours. The revenue structure of associates will also depend on the number of farmers who will pay after the crops are harvested.

However, it will be difficult to maintain Terra Source's service levels without a reliable cash flow. Therefore, preferential pricing will be given to farmers who can afford to pay for services in advance.

2.4 GROWTH AND EXPANSION

Terra Source's services are limited by our plant's treatment capacity and the total market size it can serve. It would be counter to our company's environmental sustainability goals to drive long distances to service areas. As well, being limited by the volume of water we can recycle, it would be difficult to increase the market beyond the target market share of 0.8% of Tamil Nadu's potential market size.

Therefore, in order to bring increased services to both factories and farmers, part of our action plan is to build or acquire additional treatment plants in different locales in Tamil Nadu. Terra Source should consider expansion in 2-3 years after our premier treatment facility is able to generate enough revenue so that the company will not have cashflow issues and the debt equity ratio is reduced.

2.5 RISKS

Since there are already private water treatment plants in India, competitors could enter our market easily. To defend against possible competitors, it is important to establish favorable leasing options for farmers. A competitive pricing structure that allows for sharp discounts for longer leases, and or reduced rates in year 2 or 3 would create barriers to entry from competitors. This pricing strategy is feasible since capital costs will decrease as the leases for capital equipment is eventually paid off.

However there are risks involved with this type of farming, as with almost all cash-crops where prices are set to fall due to the import-export policies set by the liberalisation process and with conditions associated with India's part in free trade agreements. Markets around the world are already feeling the effects of the heavy subsidies the US provides its cotton farmers; these

⁹Prahalad, 2005

drastically reduce the market price for cotton (Organic Cotton Netherlands, 2005). In this case it would be important to also research other industrial plants that we could adapt these services to, such as rubber plant crops.

3 - OPERATIONS AND FINANCES

3.1 REVENUE STRUCTURE

PRICING

The current value of one hectare of cotton can be estimated to be about \$40. This is based on the range of cotton value provided by Karina Schoengold and David Zilberman (University of Nebraska)¹⁰. Utilising their estimates on irrigation yield, the land value will increase to \$263/ha. This value is feasible since the US Department of Agriculture (USDA) estimates that a hectare of land yields 2018 lbs of cotton, which is worth about \$969/ha (before costs).

Before	\$40
After	\$263*
Marginal Benefit	\$223
Water Services	\$90
% of Marginal Benefit	40.33%
* $\$625/\$95 \times \$40 = \263	

The marginal benefit for farmers is estimated to be \$223/ha. The price to provide water services will be a fraction of the additional income they will receive from increased farm yields. The true cost of water services is actually lower than stated since farmers are no longer paying for water services from private water companies.

REVENUE

The cost and capacity of water treatment plants vary greatly. However small-medium plants have been built in China and Canada for between \$7 million USD (East China Township) and \$7.4 million USD (Driftpile First Nation, Alberta, Canada). The capacity of treatment facilities vary greatly, but a mid-sized facility such as the Niagara Falls Water Treatment facility can supply 145,000 kl of water each day. The capacity of this water treatment will provide service to the 17,625 ha of unirrigated farmland. This model assumes that rainfall will not fall below 20cm per year; the average rainfall in Tamil Nadu is 30cm.

0.8% of Unirrigated Land	17,625 ha
Rate	\$90/ ha
Revenue - Farmers	\$1,586,291
Total Revenue	\$1,586,291
Agriculture Fuel Costs	\$17,625
Interest Costs	\$560,000
Human Resources	\$100,000
Other Capital Interest	\$30,800
Total Costs	\$708,425
Profit	\$877,866
ROI	124%

When operating at capacity the water treatment facility will only be capturing 0.8% of the potential unirrigated market in Tamil Nadu. The rate used in the model above assumes an average price of \$90/ha. Factoring in major costs of operations: fuel, interest and human resources, we expect a profit of \$877,866 or an ROI of 124%. We estimate the cost of interest to be 7% and this will apply to the \$8 million USD water treatment plant. Other capital interest refers to the miscellaneous farm equipment, 6 tanker trucks, as well as the modification system used to convert the tanker trucks to include a mobile sprinkler system. We estimate this to be \$440,000.

The variable cost of recycling wastewater to partially reclaimed water will be covered by industrial factories; therefore, it is not included in our revenue model.

¹⁰ University of Nebraska



DIRECT SALES

The majority of our sales revenue will come from direct sales. This greatly reduces the cost of a sales team and capitalises on the regional knowledge of Terra Source's independent associates. The basic price for providing service to one hectare of land is \$90. Communities may enter into leases with Terra Source directly, however, this will require that they pay for service in installments since it would be difficult and expensive to assess the creditworthiness of each individual.

Independent associates of Terra Source are authorised to provide leases to neighbouring farms. In exchange for completing administrative work relating to collection of fees and the sale of micro leases to residents, these associates will receive a commission on each sale. The added cost of administration will increase the price paid by farmers to \$93/ha with the additional \$3/ha paid to the associate. However, the associate is expected to assess the credit of each sale. Additional fees may be applied by the associate to offset the risk of defaulting credit sales. If a certain % of farmers default on the contract, the associate will face financial penalties or the loss of lease distribution rights. A cap of 40% credit sales will be initially imposed to ensure Terra Source will not be facing cashflow issues that would impact service levels.

3.2 ACTION PLAN

Terra Source's first responsibility would be to find a location for its treatment plant. It is possible to either build a new plant or purchase an existing facility in Tamil Nadu. This area will need to be relatively close to possible partnership factories as well as farms that are relatively small in size. After finding 3 possible sites, Terra Source should enter into initial talks with factory owners to discuss recycling wastewater arrangements.

After suppliers and locations are chosen, Terra Source will finalise financing arrangements with the national bank. After the facilities are built advertising will commence to local farmers to find potential entrepreneurs. These associates will be trained in modern farming techniques as well as be given access to weather reports that will estimate rainfall for the year. This will help them create a schedule for watering services. Before the planting season begins in February, associates should collect an initial installment payment from non-credit sales, this will cover the cost of interest payments and to initial startup costs.

APPENDIX - A

Land Market Size

Total Land in Tamil Nadu	130,058	sq km
Rural Land (38.5%)	50,072	sq km
Unirrigated Land (44%)	22,032	sq km
Value of unirrigated land	\$88,127,301	based on \$40/ha for cotton
Marginal benefit	557.89%	
Multiplier	657.89%	
Benefit	\$491,657,573	
Irrigated Value	\$579,784,874	



APPENDIX – B

Works Consulted

- Cimmyt, (2001).** CIMMYT. Sourced from www.cimmyt.org/english/docs/ann_report/ar00_2001/asia/IndiPaki/India&Pakistan.htm
- City of Niagara Falls, (2008).** 'Water Treatment Capacity: Niagara Falls' www.regional.niagra.on.ca/living/water/Water-Treatment.aspx
- Environmental Justice Foundation (EJF)** <http://www.ejfoundation.org/page334.html>
- Kamdar, M. (2007).** 'India Cannot Afford Rural Failure'. YaleGlobal – 20 April, 2007. www.yaleglobal.yale.edu/display.article?id=9084
- Ninan, (2003).** India Resource – www.indiaresource.org/issues/water/2003/privatewaterpublicmisery.htm
- Noronha, F. (2004).** 'India's Supreme Court Panel Cracks Down on Hazardous Waste' – www.ens-newswire.com/ens/nov2004/2004-11-19-01.asp
- Organic Cotton Netherlands, (2005).** Retrieved from <http://www.organiccotton.nl/>
- Schoengold & Zilberman, (2004).** 'Water & Development: The importance of irrigation in developing countries.' – http://are.berkeley.edu/courses/ARE253/2004/handouts/Bretton_Woods.pdf
- Vaswani, K. (2006).** 'India's Forgotten Farmers Await Monsoon'. Business Correspondent, BBC News, Vidharbha – Tuesday, 20 June 2006.
- World Health Organisation India, (2008).** WhoINDIA – www.whoindia.org