

ADDIS ABABA UNIVERSITY
COLLEGE OF NATURAL AND COMPUTATIONAL SCIENCES
DEPARTEMET OF ZOOLOGICAL SCIENCE



On the Social and Environmental Impacts of Tinaw Floriculture Industry in the surrounding community, EzhaWoreda, Guraghe Zone Southern Nations Nationalities and Peoples Region (SNNPR), Ethiopia.

Solomon Nigatu

**A thesis submitted to the School of Graduate Studies, Addis Ababa University
In partial fulfillment of the Degree of Master of Science in Biology.**

**Addis Ababa, Ethiopia
Sept. 2016**

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Addis Ababa, Ethiopia

Sept. 2016

DECLARATION

I hereby declare that this thesis entitled the social and environmental impacts of Tinaw Floriculture industry in the surrounding Community is my own work except wherever acknowledged, no part of this thesis has been submitted to any other university.

Name _____

Place _____

Date of submission _____

Signature _____

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TABLE OF CONTENTS

ACKNOWLEDGMENT	i
Table of content	ii
LIST OF TABLE'S.....	v
LIST OF FIGURES	vi
ACRONYMS.....	vi
ABSTRACT	vii

CHAPTER ONE

INTRODUCTION	1
1.1. Background of the study area	1
1.2. Statement of the problem.....	2
1.3. Purpose of the study	3
1.4. Objective of the study.....	3
1.4.1.General objective	3
1.4.2. Specific objectives	3
1.5. Research questions	4
1.6. Significance of the study	4

CHAPTER TWO

LITERATURE REVIEW.....	5
2.1 introduction and definition	5
2.2 Overview of floriculture industries	6
2.2.1 World cut flower industry.....	6
2.2.2 Ethiopian floriculture industry	7
2.3 socio-economic and environmental view of the industry	12
2.4 social and environmental standards of floriculture industries	13
2.5 water utilization of floriculture industry.....	14
2.6 chemical utilization of floriculture industry	15
2.6.1 Effect of floriculture chemicals in the environment.....	15
2.6.1.1. Fertilizers	15

2.6.2 Pesticides	16
2.7 Environmental impacts of floriculture industry	16
2.7.1 Effect on health.	17
2.7.2 Impact on water bodies.	18
2.7.3 Impact on Soil	19
2.7.4. Impact on Air	20
2.7.5. Impact on Land Cover Change.....	20
2.7.6. Waste Disposal feature and Impact on surrounding Environment	21

CHAPTER THREE

Materials and methods	22
3.1 Description of the study area	22
3.2 Data collection methods	23
3.3 Sampling design	23
3.4 Data analysis techniques.....	24

CHAPTER FOUR

RESULTS AND DISCUSSIONS	25
4.1 related to soil	25
4.2 Related to water.....	26
4.3 Related with human health	27
4.4 Solid waste	29
4.5 Liquid waste disposal	31
4.6 Related to Environmental Impact Assessment.....	32

CHAPTER FIVE

CONCLUSION AND RECOMMENDATIONS	34
5.1 Conclusion	34
5.2 Recommendations	35
REFERENCE.....	36
APPENDIXES	39

LIST OF TABLES

Table 1 Ethiopian government support to export horticulture	9
Table 2 Percentage of planting media	25
Table 3 Estimated amount of soil fertility	25
Table 4 Social implication of Floriculture industry	29
Table 5 Type of health related disease caused by the green waste	31
Table6 Way of liquid waste disposal	31
Table 7 Interview result about the type of Fertilizer	33
Table8 Nature of land use before the Floriculture Farm	33

LIST OF FIGURES

Figure 1	water utilization of Tinaw floriculture industry.....	26
Figure 2	percentage of solid waste disposal	30
Figure 3	percentage of green waste disposal	30
Figure 4	percentage of liquid waste disposal	32

ACRONYMS

EHPEA Ethiopian Horticultural Producers & Exporters Association

EIA Environmental Impact Assessment

EEPA Ethiopian environmental Protection Authority

EU European Union

EGAP European Good Agricultural Practice

Ha Hectare

ICC International Code of Conduct

ILO International Labor Organization

MPS Milieu Program Sierteelt

NGO Non-Governmental Organization

SNNPR Southern Nation Nationalities & Peoples

UN United Nations

W H O World Health Organization

Title: The social and Environmental Impacts of TinawFloriculture Industry in the Surrounding Community.

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ABSTRACT

Floriculture is one of the diversifying industries in Ethiopia. It forms a good way to get income for the investor as well as the government too. The general objective of this research was to assess the social and environmental impact of floriculture industries on the surrounding community with respect to the existing environmental regulation and implementation and assessing a need for strategic environmental assessment which focuses on cumulative impacts. The study was conducted on Tinaw Floriculture industry & the surrounding environment (Zigbabotto village). The necessary data are collected through questioner, interviewing the employee, direct physical site observation and assessing the existing situation of the study area. The finding of the research shows that 80% of the industry uses ground water and 20% is from river.

Key words: Tinaw, Floriculture, environment, community.

CHAPTER ONE

1. INTRODUCTION

1.1 Background of the study

Floriculture can be defined as ‘a discipline of horticulture concerned with the cultivation of flower and ornamental plant for gardens and other purposes, comprising the floral industry’ (Getu 2009). It can also be defined as ‘the segment of horticulture concerned with commercial production, marketing and sale of bedding plants, cut flowers, potted flowering plant, foliage plant, flower arrangement and non-commercial home gardening’(Getu 2009).Flowers are luxurious products with high social values and rarely used for food. The demand for these luxurious products has increased in the international market in recent years (Getu, 2009). Most developing nations which have geographic advantage take it as a solution to achieve rapid economic growth (Frank and Cruz, 2001). Ethiopia like many other developing countries is attempting to diversify its export based with a view to gain new source of incomes and foreign exchange and thus reducing its exposure to price volatility that typify international market (Ethiopian Horticultural Strategy, 2007). Beside the country is benefiting from this development through creating employment opportunity for unemployed citizens. Because of this reasons, the floriculture industry in Ethiopia has become fast growing export business. As a result of due attention given by the government to this industry and unparalleled advantages that Ethiopia has in this industry compared to any other product, substantial number of investors have started investing in the country. According to Ethiopian horticulture producer’s exporters associations Pamphlet (2007), investors are attracted by an improved investment code, duty free import of machinery and easy access to bank loans and land acquisition.

In addition to the above incentives, the favorable agro-ecological condition of the country, the abundant cheap and easily trained labor proximity to EU and Middle East market encourages so many foreign and local investors to invest in Ethiopia. Despite the fact that the huge socio-economic advantage and considerable incentives are given, an internationally known social and environmental disadvantage of the industry are great.

Fleiss (2004) as reported in recent year, the global flower industry has received some negative publicity because of labor union, environmental activists and other NGOs have raised a number

of issues linked to condition of production on developing country flower farms. Inappropriate choice of cultivation methods and a wide range use of chemical and fertilizers realized for damage of large area of land and water (Fliess 2007). Long working hours and hazardous condition are also common. These social and environmental conditions started to be realized in late 1980's by many northern country consumers and caused the introduction of the international social and environmental standards for the industry (Frank and Cruz, 2001). Nowadays, there are a lot of international, regional and local, social and environmental standards to solve and minimize the risks of the industry .Ethiopia has developed her own national code of practice based on international code of conduct, the national labor and environmental laws, international labels like MPS and Euro GAP occupational health and safety standards and WHO standards.

1.2 Statement of the problem

Even though floriculture industry has economic advantage, it's social and environmental impact overshadowed its economic advantage. There are different perceptions regarding the social and environmental impact of the sector in the country. Some government officials suggest that the environmental and social effects of the sector are very insignificant and should not be concerned. Others social and environmental concerned body's beliefs that the effect of the industry both socially and environmentally is very great and require immediate attention.

Despite the fact that huge socio-economic advantage and considerable incentives are given, in Ethiopia, the internationally known social and environmental advantage of the sector is vague. Frank and Cruz (2001)Floriculture industries were taken as solution for the Economic development and gained in the generation of employment in developing countries, these advantages of the industry are at the expense of social and environmental disadvantage.The majority of workers in these farms are young women and the health effect of pesticides exposures in women and men may be different in important ways. Women on average have lower body weight and a higher proportion of body fat than men. Women's breast tissues have been associated with significant accumulation of fat associated pesticides. When women breast feed, these pesticides may be passed on to nursing infant. In addition, effects of certain pesticide's on human hormone may affect women and men differently and can have negative impact on developing fetus (Jacobs and Dinham, 2003). Jobs are often temporary, seasonal, casual and migrant, hence precarious (Jacobs and Dinham 2003).

Long working hours and hazardous condition were also common. Health and safety provisions are often poor, with workers not being provided with protective clothing, toilets, washing facilities and drinking water (Smith 2004). In appropriate choice of cultivation methods and a wide range use of chemicals and fertilizers have a negative impact on soil and water condition. Too much use or misuse of herbicides and pesticides can threaten human, animals and plant life. The trade transport and sales of flowers and plant cause a considerable amount of packaging wastes such as boxes, trays and plastics that can cause pollution due to toxic substances (Flies ,2007). More over the Industry also created land holding problems. There was little or no research work was done about the environmental and social impacts of the sector while the floriculture Industry is blooming in the country. Thus, this study was addressed the social and environmental implication of Tinaw floriculture industry in the surrounding community.

1.3 Purpose of the Research

The purpose of the study was to assess the impact of Tinaw Floriculture Industry on the environment. The study is expected to suggest solutions to the existing problems of the Industry. This study will also try to look into land holding and food insecurity related to the floriculture industry.

1.4 Objective of the study

1.4.1 General objective

The general objective of this thesis was to assess the impact of Floriculture industries on the surrounding Environment with respect to the existing Environmental regulation and on human health.

1.4.2 Specific objectives of the study

To assess the impact of chemical usage and intensive use of water resource in the surrounding environment.

To assess the impact on human health and soil fertility.

To assess the regulation and proper implementation of Environment Impact assessment/EIA/.

1.5 Research question

What are the impacts of Floriculture industries on the surrounding Environment?

What health related problems have been caused by Floriculture industries on human being?

1.6 Significance of the research

My study was hoped to have an understanding of the experience of Tinaw floriculture industry on social and environmental aspect. Especially, the study tries to explore the situation of the flower workers in the industry. The study can increase awareness about problems that flower farm workers face particularly for women workers, who comprise the majority of the work force and how the industry affect the environment will give an insight into whether the floriculture industry in Ethiopia is operating according to the standards set by the international code of conduct(ICC).The findings of the study may encourage concerned bodies and farm owners to be more conscious of the issues and it can initiate the formation of a national code of conduct that governs working conditions at flower farms and the environment.

CHAPTER TWO

LITERATURE REVIEW

2.1. Introduction and Definition

Floriculture, or flower farming, is a discipline of horticulture concerned with the cultivation of flowering and ornamental plants for gardens and for floristry, comprising the floral industry. The development, via plant breeding, of new varieties is a major occupation of floriculturists (Wikipedia, 2011). According to encyclopedia environmental health (2011) Floriculture refers to the cultivation or farming of flowering and ornamental plants for gardening and floristry, including floral design. Floriculture crops are typically herbaceous differentiating them from nursery crops, which are typically woody. Floriculture crops include flowering plants, bedding and garden plants, foliage or house plants, fresh cut flowers, and cultivated greens. Floriculture includes all commercially grown flowering and ornamental plants in greenhouse-based pots, trays, troughs, contained beds or in field settings (wqpn, 2006). Bedding and garden plants are typically grown in cell packs and marketed in flats or trays, pots, hanging baskets, or large mixed containers for the landscape. Bedding and garden plants may be either annual or perennial and are often vegetable or herb transplants. Floriculture crops are typically grown in a controlled environment or greenhouse (i.e. glasshouse) however; many cut flowers may also be grown out-of-doors in many climates (SE Newman, 2011).

Wikipedia (2011) as distinguished from nursery crops, floriculture crops are generally herbaceous. Bedding and garden plants consist of young flowering plants (annuals and perennials) and vegetable plants. Cut flowers are usually sold in bunches or as bouquets with cut foliage. The production of cut flowers is specifically known as the cut flower industry. Farming flowers and foliage employs special aspects of floriculture, such as spacing, training and pruning plants for optimal flower harvest; and post-harvest treatment such as chemical treatments, storage, preservation and packaging. In Australia and the United States some species are harvested from the wild for the cut flower market (USEPA, 1990).

2.2 Overview of Floriculture Industries

2.2.1 World Cut-flower Industry

People all over the world realize that flowers enhance the quality of life and influence human feelings more than words or other gifts. Globalization, cultural exchanges, and celebrations enhancing fraternity such as New Year, Valentine's Day, Memorial Day, Mothers' Day, Fathers' Day, Christmas, and weddings have induced people globally to use flowers as a means of sharing their feelings. Above all, these celebrations have acquired one-to-one pairing with flowers in some cases, e.g. roses to Valentine's Day and carnations to Mother's Day. Increased use of flowers and ornamental plants makes marketing of flowers a lucrative business (Belwal and Chala, 2008 p. 217).

The majority of cut flowers are produced in countries with dedicated infrastructure having facilities for airlifting to major distribution centers. The Asia/Pacific region leads in flower production with a total production area of 244,263 hectares followed by Europe (54,815), Central/South America (45,980), North America (26,135), Africa (5,697) and the Middle East (3,845). The AIPH report estimates a global area of 360,000 hectares dedicated to world flower and plant production involving USD 60 billion in value terms and 100,000 companies (Belwal and Chala, 2008 p. 218). Belwal and Chala (2008) in 2001, the UN International Trade Centre estimated the global area of 200,000 hectares dedicated to cut flowers commanding value of USD 27 billion. In terms of total area of production, Asia and the Pacific cover nearly 60 percent of the total world area. The key markets for flower are Western Europe, North America and Japan. The EU is the world's leading importer of flowers. The other largest importers are Germany, the USA, the UK, France, The Netherlands and Switzerland accounting for nearly 80 percent of global imports.

Hamrick (2004)), the Netherlands is the world's largest producer of cut flowers and foliage valued at USD 3.6 billion, followed by Germany and Italy. In addition, The Netherlands plays a major role in setting the global standard for daily prices through its computerized clock auction system and acts as the logistical distribution center for Europe. South American countries Colombia and Ecuador as well as Israel, are the major producers of carnations and roses. An increasing investment has also been witnessed in Kenya and other African countries.

The share of the developing countries in the total trade has consistently been around 20 percent during the last five years. There has been a growth in the number of producing countries particularly among the developing nations in Asia, Africa and Latin America (<http://www.fao.org>). In the African continent, Kenya leads cut flower exports, expanding annually at 10 to 15 percent per year, followed by Zimbabwe. Flowers are becoming the driving force in the growth of Kenyan agricultural exports (Hamrick 2004). Hamrick (2004) export of roses (comprising 75 percent of flower export by weight) from Kenya was up by 19 percent in 2003 to The Netherlands auction market and increased the competition. Existing farms are being expanded and newer ones are being created in countries such as Tanzania, Uganda, Ethiopia, Malawi, Zambia, and Namibia. However, established flower producers have found investing in more than one African country helps spread the risks. Some countries are both producer as well as consumers. In Israel, Africa and South and Central American countries, cut flowers have been a product produced mainly for export with no thought of a potential domestic market. On the other hand, in Asia, whereas cut flowers were initially produced for export, the market potential has rapidly changed to include opportunities for supplying to the local market as well. This unique development is on account of the rapid strengthening of economies in the region, high population densities, and the changing consumer's perception towards importance of flowers in their lifestyle. If we take the case of Ethiopia, it is only recently that the mere concept of flowers as a gift emerged. Thus, the domestic market is not yet mature. Notwithstanding, Ethiopia has attracted several foreign investors in recent years, for exporting cut flowers mainly to European markets (Belwal and Chala, 2008).

2.2.2 Ethiopian Floriculture Industry

In recent decades, the global demand for cut flowers has grown considerably. This growth in market demands and its diversification value has attracted increasing numbers of developing countries to the global fresh flower trade. These reasons seem to make Ethiopia come in to the picture of this business. But some people say that Ethiopia gives attention for this sector because the European production cost skyrocketed. European cut flower growers (especially Netherlands) have been looking to other continuities for more affordable conditions as experienced other East African countries like Kenya, Tanzania and Uganda (Laws, 2006).

Though floriculture development in Ethiopia blooming in recent years, it started for commercial purpose in 1980/81 which is now twenty six years ago. The first fresh cut flowers production

was commenced in 1981 /82. The Derge regime had established Horticulture development corporations where government was responsible both for regulation and production even for marketing of horticultural products including flowers. During that time the production and export of cut flowers in Ethiopia was not established with well-planned and aiming of profit seeking but foreign exchange earnings (Ethiopian Horticultural Strategy, 2007 p. 10).

As a result of this, the industry was one of the highly subsidized sub-sectors during the derg regime (Habte, 2001). Floriculture was started to show modest increase in 1990s by 2-3 % from the agricultural output of the country. In 2001 it contributed \$ 4.7 million to the country's foreign currency earnings. But it was not as such significant enough to say it was important sector to develop the country's economy. In five years the total export earnings increased at least five times that figure. (Ethiopian Horticultural Strategy, 2007 p.10).

Because of the Government of Ethiopia gave more attention for favorable investment condition and a more enabling atmosphere for private sector development the floriculture sector started to grow fast in the last few years. The first private floriculture producer started around 1997, a second in 1999. From 2001 onwards, other growers started coming in and according to Trade and Industry floriculture industries under production reached 65 in the year 2006 (Ethiopian Horticultural Strategy,2007 p.10.).

Table 1: Ethiopian government support to export-horticulture

<p>Government's allocation of a substantial amount of finance for investors who would like to engage in the sector and special loans are provided through the Development Bank of Ethiopia. Ethiopia's Investment Law</p>	<p>According to the revised investment law, a foreign investor can invest on his/her own or jointly with a domestic investor.</p> <p>The Investment law guarantees capital repatriation and remittance of dividends.</p> <p>The Investment law provides investment guarantee. Investment guarantee and protection; in Ethiopia both the Constitution and the Investment code protect private property</p>
<p>Investment Incentives</p>	<p>A package of incentives under regulation No.84/2003 developed</p> <p>Incentives are available both to foreign and domestic investors. No discrimination between a foreign and domestic investor.</p>
<p>Types of Incentives</p>	<p>Customs duty exemption</p> <p>Income tax exemption</p> <p>Loss carry forward</p> <p>Remittance of fund</p> <p>Land availability for investment on leasehold basis</p> <p>Utilities: electricity, telephone, water and road</p>

Source: Ministry of Trade & Industry (2006)

These government support initiatives attract more and more foreign and local investors to the country to participate in the floriculture development. According to Ministry of Trade and Industry totally in the Horticulture sector, most of them are floriculture investors there are 235 licensed projects with an aggregate capital of 7.5 Billion Eth. birr, out of which foreign investors owned projects of 171 with capital of 5.3 Billion Eth. birr and local investors owned projects of 64 with aggregate capital of 2 Billion Eth. birr (Ethiopian Horticultural Strategy, 2007).

These high level support not only attract more and more investors and it helps Ethiopia has better comparative advantage as compared to other production countries in the region together with near to ideal agro climatic condition, proximity to EU market and relatively cheap labor. Hence the sector is growing dramatically, in 2006 Ethiopia was the second largest exporter of large roses to the Dutch auctions (after Kenya) and the third largest supplier for small roses (after Kenya and Uganda) (Ethiopian Horticultural Strategy, 2007).

Government of Ethiopia formulated a comprehensive development strategy for the period 2005/06 – 2009/10 called ‘Plan for Accelerated and Sustained Development to End Poverty’ (PASDEP) to attain the Millennium Development Goals (MDGs) by 2015. Under this PASDEP it set program target an intensification of the recently initiated flower production in areas with altitude between 1,600 – 2,600 meters above sea-level. Accordingly, out of the total of 2,031 ha of land leased to investors, the land covered by greenhouses is expected to reach 1,600 ha; an additional 400 ha of land will be put under greenhouse shelter. The area under flower production (roses, cuttings, summer flowers) would thus increase from 519 ha in 2005/06 to 2,000 ha in 2009/10. In terms of employment generation the policy objectives is to increase the number of employees from well over 21,000 in 2005 (64.4% female workers) to a total of 70,000 in 2009/10 (Ethiopian Horticultural Strategy, 2007). The recently initiated flower production areas are mainly around Addis Ababa, Upper Awash valley and Lake Ziway. Addis Ababa, the capital, with its altitude elevated about 2000 meters is the most suitable place for the production of high quality roses. Besides its suitable weather, all the infrastructures like roads, power, telecommunication and water have been availed for the investors in floriculture sector. Most of foreign and domestic investors on flower production have started their production on this area. It is also practically witnessed that Ethiopian highlands provide “Near Ideal” growing condition for roses. In the Upper Awash Valley with an altitude spanning from the range of 1200 to 1400

meters and the farms are located along the length of the River Awash with in 149 – 220 km away from the capital. Lake Ziway which is located in the southern region of the country (165 km from Addis Ababa) the farms situated between Lake Ziway and the main highway with altitude range between 1600–170m above sea level(<http://www.ethiopiaemb.org.cn/investpolicy.htm>) Among the resources which make Ethiopia favorable for floriculture development is water and irrigable land resources which the country has and the flower needs in abundant. Ethiopia has 122 billion cubic meter surface water, 2.6 billion cubic meter ground water, 12 rivers 11 basins, 18 natural lakes including the rift valley lakes and a potential of 3.7 million hectares irrigable land (<http://www.ethiopiaemb.org.cn/investpolicy.htm>). About 80 – 90 percent of these resources are located in the west and south west of the country where close to 40 percent of the Ethiopian population lives and 10 – 20 percent of these resources are located in the east and central part where most of the population has settled. But the above principal production sites are located within the low resource available and highly populated areas (<http://www.ethiopiaemb.org.cn/investpolicy.htm>). Most of the Floriculture farms are largely confined around the vicinity of Addis Ababa. Most farms were located in West Shewa particularly located in Holleta, Sebeta and Addis Alem while the rest are more or less evenly distributed in the Rift Valley and the Awash River Basin systems (Laws, 2006).

The fact of the matter is that Ethiopia is still in the beginning stages of floriculture industry and there are a number of challenges that must be resolved to continue the development of the sector with the present rapid speed. Among the challenges include social and environmental impacts of the sector which can create pressure on the sustainability and market acceptability of flower industries. According to recommendation given on the “Development strategy for the export-oriented horticulture in Ethiopia” based on the stakeholders discussions at the workshop on February 9th, 2007, Ethiopia needs development of a conducive legislative framework and pesticide registration system which is felt under responsibility of Government especially Ministry of Trade and Industry and Ministry of Agriculture and Rural Development as well as development of a Code of Conduct at sectorial level to demonstrate compliance with general standards (environment, workers’ welfare, etc.) with responsibilities of Ethiopian Horticultural Producers and Exporters Association (Ethiopian Horticultural Strategy, 2007).

EHPEA currently take the initiative of developing a Code of Conduct for the Ethiopian export horticulture with support from the Dutch partnership program. This is very timely and relevant. Having a certified code of conduct is often seen as a way to lower transaction costs and improve market access and customer loyalty. Exporting countries with no code of conduct have a rather low level of export growth. In addition, the first groups of Ethiopian growers are in the process of obtaining MPS-certification. A Code of Conduct for the export horticultural sector is very important to secure market access for the sector in general. The certification for quality standards such as MPS will be beneficial, particularly at the individual company level. It contributes to the improved reputation of the suppliers and as such lead to greater customer loyalty (Ethiopian Horticultural Strategy, 2007).

2.3. Socio-economic and Environmental view of Floriculture Industries in Ethiopia

Since the industry is at its infancy stage and the government as well as optimistic society of the country were very pleased at the beginning observing that it will increase the nation's foreign exchange and give a work opportunity of many jobless society. More than hundred thousands of citizens got a job directly or indirectly from the sector and most importantly women accounted for 70% of the total work force mainly located at rural areas. Due to the fact that women within such a developing country have some difficulties of having their own job it is turn out to be an important source of income and one way escaping from being dependent on their husband or family's shoulder. However, through time to time the initial reputation of the industry diminish after some opposition party parliament members and some press releases of an information that the industry has a negative impact on social and environmental aspect quoting as a reference Kenyans flower industry. These groups' claims the fact is that many flower investors in Ethiopia are came from Kenya after they are evicted from Kenya for their contribution of environmental degrading on Lake Naivasha. For instance, All Africa newspaper in its 21 February 2006 publication report that five major flower farms from Kenya abandon Lake Naivasha (Belwal and Chala 2008).

Many Ethiopian environmental activists still argue that environmental policies or standards, labor regulations are not implemented by many companies within the industry as per the

standards provided by the government. These concerns are related to labor right like working condition (Belwaand Chala 2008). One of the issues which floriculture industries worldwide commonly blamed is unsafe working conditions of floriculture farm laborers associated to massive chemical usage of the industry. International environmental and workers advocacy groups charge the floriculture industry which grows cut flowers in greenhouses with exposing laborers to dangerous pesticides, with failing to provide health safeguards, and with damaging the environment from over use of nature resources. From a study made in Colombia, even if the industry provides jobs, and in particular jobs to segment of the Colombian population that doesn't have access to jobs very easily, or to jobs that pay well, the economic gains may still come at a cost to worker and environmental health (David, 2002).

2.4 Social and Environmental Standards of Floriculture Sectors

International social and environmental standards for floriculture industries first introduced because of awful working condition in many flower farms around the world. In addition to this awful working conditions many Northern countries consumers started to realizes the negative environmental impacts of cut flowers through the promotion of different social and environmental concerned peoples and organization. Among the social and environmental organizations Flower Campaign was the most known and oldest organization which established in the year 1990 in Switzerland and Germany. The organizers of the Campaign were Bread for the World, the International Human Rights Organization FIAN, and The children rights organization terredes homes (Frank & Cruz, 2001).

The Flower Campaign starting point was Colombia, biggest producer from developing nations and where many complaints about human right violations, health effects, etc. were lounged. The Campaign straggled first to reach working and living conditions of flower workers in Colombia and elsewhere through public action on the issues involved and maintain a continuous dialogue with flower producers, traders and representatives from governmental bodies, consumer association, development experts, horticultural specialists and European chemical companies. The aim of the Campaign was to bring these actors together their shared responsibilities for humane and ecologically sustainable production of cut- flowers (Frank & Cruz, 2001).

In 1993 “Colombian Clean Flower Declaration” proposed as a response to the Campaign to provide an independent monitoring of the legal national prescriptions. And in 1995 the Flower Campaign proposed a “Quality Seal for Cut Flowers” including ecological, social and labor aspects and independent mechanisms of control of the farms. But the dispersion of the cut-flower trade into more than 15,000 small outlets in Germany made a seal difficult to control. Therefore, in August 1998, the Flower Campaign proposed jointly with other organizations the international code of conduct (ICC) for cut-flower production. The ICC is based on the universal Human rights, the ILO conventions and basic environmental standards (Frank & Cruz, 2001).

Contents of International Code of Conduct (ICC) includes: Freedom of association and collective bargaining, Equality of treatment, Living Wages ,Working Hours ,Health and Safety, Pesticides and chemicals ,Security of employment ,Protection of the environment ,Child labor, Forced labor (IFC,2004).

2.5 Water Utilization of the Floriculture Industry

Greenhouses require water for irrigation, cooling, pesticide application, root-zone media preparation, and cleanup. A one-hectare greenhouse has the potential to use between 120 000 and 160000 liters per day. The majority of this water is used for irrigation and its rate of use is dependent on the level of solar radiation, greenhouse shading, and air movement in the greenhouse, types of plants grown, irrigation system design, and the degree of leaching employed. Best management practices in a greenhouse usually include runoff minimization, efficient irrigation system design, reduction in overwatering, integrated pest management using less pesticide application, fertility optimization, reduction in storm runoff by diversion and storage for irrigation, and proper disposal of greenhouse runoff through treating and recycling runoff and reverse osmosis (SE Newman, 2011).Moreover, too much use of water leads to - conflict with the local community, as was the case in the Naivasha district in Kenya. It may also lead to depletion of water from its natural reservoir (SE Newman 2011)

In Ethiopia, there is not a special water management strategy being applied in the cut-flower industry. Similarly, neither water treatment nor recycling is well adopted. Only a few farms are currently applying reverse osmosis, UV treatment and recycling. Routinely used to control the growth of algae in reservoirs and water delivery pipes (Abiy, 2011). Intensive utilization of water

resources without considering the coming consequences will lead to reduce the ground water table, as USEPA (1990) after intensive water use by floriculture, the water table has dropped under the savanna surrounding Bogota.

2.6 Chemical utilization and WHO standard for chemical usage in Floriculture Industry

Due to the growth of the industry, environmental concerns are indeed growing. Environmentalists are raising many concerns in relation to the expansion of floriculture in Ethiopia, such as the use of pesticides and chemical fertilizers, disposal of waste materials, and the protection of bodies of water. According to environmentalists, there is an overuse of pesticides and chemical fertilizers in the industry, which damages the environment. They believe that too much pesticide is getting into bodies of water, damaging the biodiversity. Excessive amounts of chemicals are killing useful organisms in the soil. Environmentalists are also concerned that waste materials will damage the environment that they will seep into the soil, into bodies of water, or be used by people and cause serious damage (Wikipedia, 2011). Abiy (2011) While development has been reported in application of chemicals largely due to awareness of workers, pressure from labor unions within the farms, and directives of the Ministry of Agriculture, there are still some hazardous chemicals that are still in use (see table 1) Class 1a extremely hazardous and class 1b highly hazardous categories of the WHO that are still in use in the Ethiopian flower industry.

2.6.1 Effects of Floriculture Industry Chemicals on Environment

Pesticides and fertilizers used in the normal course of growing plants are the most important potential threats to groundwater. Pesticides having high leaching potentials, high surface loss potentials, or which are persistent in soil are of greatest concern. Method of application, pesticide formulation, soil type, and microbial activity in the soil are some other factors which affect how much chemical may reach the groundwater (Hengsdijk and Jansen, 2006).

2.6.1.1 Fertilizers

Use of excessive amounts of improper application of fertilizers and pesticides may result in harmful chemical contamination of ground water (David, 2002). Fertilizers are significant

pollution treats because of their high solubility and the frequent application of large volumes of irrigation water (Thrupp and Lori, 1998).

Nitrogen and phosphorus must be managed carefully to ensure that excessive amounts do not degrade water quality. Too much nitrogen and phosphorus along with carbon in surface water cause eutrophication (excessive algae growth) in rivers, lakes, and ponds (David, 2002). And also, application of “bad” fertilizers or too many fertilizers can cause severe problems to plants or soil microbes. With increased soluble salt content in the soil, the ability of the roots to absorb water and nutrients is reduced, and the plants will wilt and die due to dehydration (Afrogadaa, 2010).

2.6.1 Pesticides

Methyl bromide, ozone depleter and a category acute toxin, is a heavily used and is among the most dangerous toxic substances known. There exists a wide array of other pesticides with known health risks. Some fungicides used, such as Mancozeb and Captan are suspected carcinogens, and such herbicides as parquat, are extremely toxic through any route of exposure, whether absorbed through the skin, inhaled, or somehow ingested (Meer and Vander, 1997).

Chemical pest controls, increase soil salinity and destroying its productivity. In-house Agronomist Mr. Seyoum Fenya, talk about Ethiopian flower farm experiences on pest control, the containers which store twenty liters of pesticide used each day on Menagesha Flower farm, are reportedly buried in the grounds without being sealed. Even if the containers are sealed and then buried, thus following the advice of the Ethiopian Environmental Protection Authority, this probably only delays a huge future environmental catastrophe. Moreover, too much chemicals kill useful organisms in the soil. And if too much pesticide gets into water bodies it damages the biodiversity (Afrogadaa, 2010). The land once used by the flower industries will take 40 to 60 years to rehabilitate if intensive treatment was conducted to that extent (Afrogadaa, 2010).

2.7. Environmental Impacts of Floriculture Industries

With the expansion of the floriculture industry, there is a growing EHPEA concern as to its adverse effect on the national environment. EHPEA is aware of this concern and stated that, “When any new sector is introduced into a country there are inevitably concerns about the

impact of the sector on the local environment....” (Mr. Tsegaye Abebe, head of Personal communication). The only alternative to chemical/artificial fertilizers is the use of organic cultivation. Nitrogen in fertilizer can produce nitrates, which can be washed away from fields by rain or irrigation, eventually finding their way to water bodies and soil. Water pollution, soil and water quality degradation, human and cattle health effects, air pollution, risk on aquatic life, as well as water logging and salinization are only a few of the undesired impacts (Mulugeta, 2009). Pesticides (which include herbicides, insecticides, fungicides and more) can contaminate organisms, soil, water, turf, and other vegetation. It is estimated that less than 0.1 percent of the applied pesticide reaches the target pest, leaving 99.9 percent as a pollutant in the environment, including the soil, air, and water, or on nearby vegetation. The adverse effect of pesticide use includes degrading water and soil quality, effect on non-targeted lives like soil organisms, aquatic life, human beings, insects, cattle etc., air pollution, and increase of pesticide resistance by targeted pests (Mulugeta, (2009). Pesticides and fertilizers used in the normal course of growing plants are the most important potential treats to ground water. Pesticides having high leaching potential, high surface loss potentials, or which are persistent in soil are of greatest concern. Method of application, pesticide formulation, soil type and microbial activity in the soil are some other factors which affect how much chemical may reach the ground water (Hengsdijk and Jansen, 2000).

2.7.1 Effects on Health

With regard to matters dealing with workers’ health and safety issues, different literature indicated that they face problems that affect their health conditions. For example, the absence of toilet facilities and their poor condition, absence of clean drinking water, showers, absence of maternity leave as well as absence of first aid and free medical care coupled with the presence of high temperature in the greenhouses create potentially hazardous effect on workers’ health. However, chemical were seen damaging the health of the workers. Skin chemical allergies, respiratory problems, and unconsciousness because of inhalation of chemicals are among the direct health problems associated with the chemicals as witnessed by the health centers. In addition to these health problems mentioned by health centers, the workers added early abortion in women, birth problems, stomachache, vomiting and poor appetite(Personal communication).

Many diseases such as methemo globinemia, Japanese encephalitis (JE), cancer etc. have been noted due to use of chemical fertilizers. Some researchs demonstrates that “on rare occasions, nitrates have caused infants to become ill or die of Methemo globinemia (more commonly known as blue-baby syndrome).” Methemo globinemia occurs when the excess nitrates that remain in the soil move into the ground water and when this water is used for drinking by human beings as a result of which the nitrite interferes with the oxygen carrying capacity of the blood (Mulugeta, 2009). However, the management does not seem to be concerned about worker’s health, as they do not seem to be taking measures to improve some of the important facilities such as the provision of safe drinking water and toilets on the farm. Instead, the management is more interested in protecting the flowers from plant diseases rather keeping the workers healthy (Workneh, 2007). The Floriculture farms were seen very close and there was only ten meters between the farm and road to densely populated residents of the area. The neighboring households were strongly complaining of a pungent and irritating smell coming from the nearby farms especially while chemical spraying was going on in the farm greenhouses. Most of the time the chemical spraying was done in the morning times and the surrounding communities explained they were unable to eat their breakfast because of the disturbing bad smell coming out of the farms greenhouses(Fatuma, 2008). UWEA (2006) mentioned from its research in Ugandan floriculture industries in the neighboring communities of flower farms complain of a smell when spraying was going on at the farm. According to UWEA (2006), it was also reported that bees which are necessary for pollination have disappeared due to spraying, hence poor yields in the surroundings.

2.7.2 Impact on Water Bodies

There are many fertilizers, which leak through the soil to the ground water or ditches and streams, thus causing water pollution. In a process known as eutrophication, fertilizer washed from fields into surface waters stimulates algae growth, which blocks sunlight needed by aquatic vegetation putting their survival at stake. This loss in vegetation disrupts the food chain, leading to the death of economically important aquatic life. Moreover, this causes depletion of oxygen found in the water thus degrading the quality and usability of the water (Sadler B and Verheem R (1996)). Pesticides can move from the site of application via drift, volatilization, leaking, and runoff. Pesticides, including herbicides, can and do leak to contaminate ground water. Once

ground water is polluted with toxic chemicals, it may take many years, a huge expense and a complex process for the contamination to be cleaned up. As a result, the contamination (by pesticides) of ground and surface water, which supplies the greatest part of drinking water, is a serious problem worldwide. When pesticides contaminate water, they can be harmful to the fish and other marine or freshwater animals that live there (Meer and Vander 1997). Additionally, Solid wastes and toxic chemicals that contaminated water body can develop water born disease (Abiy, 2011). Lake Naivasha in Kenya floriculture farms has been accused of polluting the lake water through extensive use of chemicals, which has had a heavy effect on the lake's biodiversity. Fishermen highly blame that fish stocks are declining and the lake is being polluted by chemicals. Because of this there is usually conflicts raised between the community and the flower farms and some of them are feeling insecurity to produce comfortably (Becht .,2006). Aquatic life is in danger with floriculture industries effluent of wastewater. As a result of the Second North Sea Conference in 1987, a number of countries agreed to reduce discharges of certain chemicals in to water systems (Megara and John, 1999). Researchers took small samples of water from local rivers and flower farms, and samples of discarded flowers from the farms. Flower farmers deny channeling water into rivers and natural water courses after they have watered their flowers. But investigators found that very few would treat water after it had passed over the pesticide-covered flowers (Stevenson et al., 1997).Most use of excessive amounts or improper application of fertilizers and pesticides that result in harmful chemical contamination of the total environment and high pollution effect on water bodies (Whiles 2000).

2.7.3 Impact on Soil

A growing crop does not take up all the nutrient ions in the fertilizer applied to the soil. Generally, healthy soil contains enough nitrogen fixing bacteria, which fixes sufficient atmospheric nitrogen to supply the needs of the growing plants. But continued use of chemical fertilizers may destroy these nitrogen-fixing bacteria and many other micro- and macro-organisms of the soil. In addition, an acid in chemical fertilizers, such as sulfuric acid and hydrochloric acid, which tends to increase the acidity of the soil, reduces the soil's beneficial organism population and interferes with plant growth. (Mulugeta, 2009). Another most visible impact is the depletion of the soil through the intensive usage of fertilizers and chemical as well as during the waste disposal of cut flowers. The different types and number of chemicals exposes

the soil to lose its natural fertility. They have different character and reacted differently when they apply to the soil and change its texture, acidic value and fertility. Researcher from Colombia stated the treats that “Flower farmers in Colombia don’t realize that the intensive use of the soil, the water and the intensive and excessive use of chemicals is going to convert the Savannah of Bogota into a sterile land,” (USEPA, 1996).

2.7.4 Impact on Air

Some fertilizers, like Urea, spread in the fields with the help of sprayers and the ammonia therein react with the water present in the air causing the formation of ammonia oxide, and hence air pollution. Foliage, moves away from the area of application, and contaminate the environment. As much as 80-90 percent of applied pesticides can be volatilized within a few days of application (Mulugeta, 2009). Due to its highly volatility nature, is estimated that only 0.1 percent of the total applied pesticide attains its intended goal but the rest 99.9 percent leaves as an air pollutant. And the pesticides applied in the greenhouses travels an average distance of 1,500 miles, adding significantly to global warming and air pollution (Anonymous, 2003). Abiy (2011) there are still some hazardous chemicals that are still in use. The use of methyl bromide is not officially encouraged by any institution. However, it is not yet banned from application in flower production. Methyl bromide is a fumigant that is regarded to be a serious ozone depletion agent. Ethiopia ratified the Vienna Convention and Montreal Protocol in October 1994 to help support in the regulation of the use of ozone depleting chemicals.

2.7.5 Impact on Land Cover Change

Most of the local communities and previous land holders perceived and explained the issue of land use change in association with the shortages of agricultural products, fuel and construction woods and price increase as well as the rapid climatic change seen in the locality. They were stressing that, because of most of agricultural lands and eucalyptus plantations were changed from forest cover and farm lands to floriculture farms, therefore, there have seen a shortage of agricultural products and forest products. Most of the people in Holeta area explained, as a result of their poor livelihood and increased prices of produce they couldn’t afford to purchase agricultural and forest products as per their needs. This finding was confirmed by the ILO

(2006).report document on Ethiopia which stated that one of the side effects of floriculture expansion is problem of conserving the forest resources(Fatuma, 2008).

2.7.6 Waste Disposal Feature and Impact on Surrounding Environment

Floriculture activities produce different types of waste ranging from liquid to solid, hazardous to non-hazardous, and in effect require safe waste disposal and differentiated treatment. Empty chemical containers (fertilizers, pesticides) and their washing waters and obsolete chemicals are the major spheres of concern in addition to which other agricultural waste such as cut off crop parts, unused soil, and waste water are generated in the sector. Abiy (2011) Chemical containers, diseased plants, residue of cut-flower Stems and plastics are some of major solid wastes. It is known that up to 500 tons of residues per hectare per year are generated from flower farms. Liquid waste that cannot be reused or recycled should be collected and kept in impermeable containers or solar evaporation ponds. The waste residue should be transported off-site for safe disposal at a local, council-approved waste disposal area. However, the flower farms in Ethiopia have been heavily criticized for not having adequate means of waste management systems (Abiy).

CHAPTER THREE

MATERIALS AND METHOD

3.1 Description of the study area

Tinaw business Share Company was established in 2006 by five shareholders, with the major objective of engaging in various business portfolios in a phase by phase basis with the initial focus on horticulture areas, floricultures in particular.

The companies head quarter is in Addis Ababa, the capital city of Ethiopia. The farms are located in SNNPR, Guragezone, ezha district, Zigbabotto village, 175 km south west of Addis Ababa at an altitude of 1970m above sea level .The company started operation on seven hectares of greenhouse coverage and has undergone subsequent rose flowers expansion project. Recently the company grown seventeen varieties of rose flowers on 26.6 hectares of greenhouse coverage and exports to the international market mainly the Netherlands. The company has become one of the most competitive companies in the international floricultures business which is characterized by aggressive competition. It generates considerable foreign exchange to the country and has provided job opportunity for 900 workers.



3.2. Data collection methods

All the necessary data were collected based on questionnaire, reviewing related literature, interviewing the employee and direct physical site observation.

3.3. Sampling design

Out of the 900 employees available in the industry, 100 respondents are chosen using random sampling methods to fill the questionnaires. From the respondents ten of them were professionals and the rest were daily labor. For interview, 20 people who live in the neighborhood of the

industry would be selected. Before distributing the questionnaires to these respondents, the aim of the study would be explained for them.

3.4. Data analysis techniques

The major data analysis techniques of this study were both quantitative and qualitative techniques. In quantitative techniques, descriptive statistics in the form of percentage and frequency were used to analyze the data and the responses are compared. Qualitative data from questioners as well as interviews were analyzed thematically, whereas quantitative techniques were employed in the computation of statistical table, bar graph and chart.

CHAPTER FOUR

RESULTS AND DISCUSSIONS

4.1 Related to soil

Tinaw Floriculture industry farm preferred soil bed as planting media because of its economic effectiveness; obviously the impact on the environment is not their own concern. According to the farm manager it was preferred to use all planting media from soil bed because using hydroponics and pot bed as a media is expensive and more sensitive even if its environmental benefit is not recognized.

Table 2: Percentage of planting media is described in the table below

Planting media	Hectare	Percentage
Soil bed	13.3 Ha	50%
Pot bed	6.65 Ha	30%
Hydroponic	6.65 Ha	20%
Total	26 Ha	100 %

From the data taken from the respondents estimate, 50% of the Farm uses soil bed, 30% of the Farm use spot bed and the remaining 20% were from hydroponic.

Table 3: Estimated amount of soil fertility rate after chemical utilization

Time	Bad	Good	Very good
When the farm begins	7%	13%	80%
After a year	27%	40%	33%
Recent status	53%	33%	14%

From the data taken from the respondents in relation with estimated rate of soil fertility, when the farm begins, 7% of the respondents agree that it was bad, 13% of them agree on it was good and the remaining 80% of the respondents suggest that it has a very good fertility rate. After a year, 27%, 40% and 33% of the respondents agree that estimated amount of soil fertility rate was

good, bad and very good respectively. The recent status of soil fertility as taken from the respondents shown that 53% of the respondents agree that the soil has bad fertility rate, 33% of the respondents agree that the soil has good fertility and the remaining 14% of the respondents respond that it has a very good fertility rate. Therefore when we see percentage estimate of soil fertility rate, there was a general trend that is a general decrease in soil fertility rate starting from the establishment of the farm up to the present status. Chemical pest control method increase soil fertility and destroying its productivity (Meer and Vander 1997). Mr. Addisu Tamene an agro economist in the flower farm said that “once the land was used by flower industries, it would took 40 to 60 years to rehabilitate if intensive treatment was conducted”. (Personal communication).

4.2. Related to water.

From the data taken from the respondents, 80% of Tinaw floriculture farmuses ground water and the remaining 20% is obtained from reservoir as it is shown in the graph below.

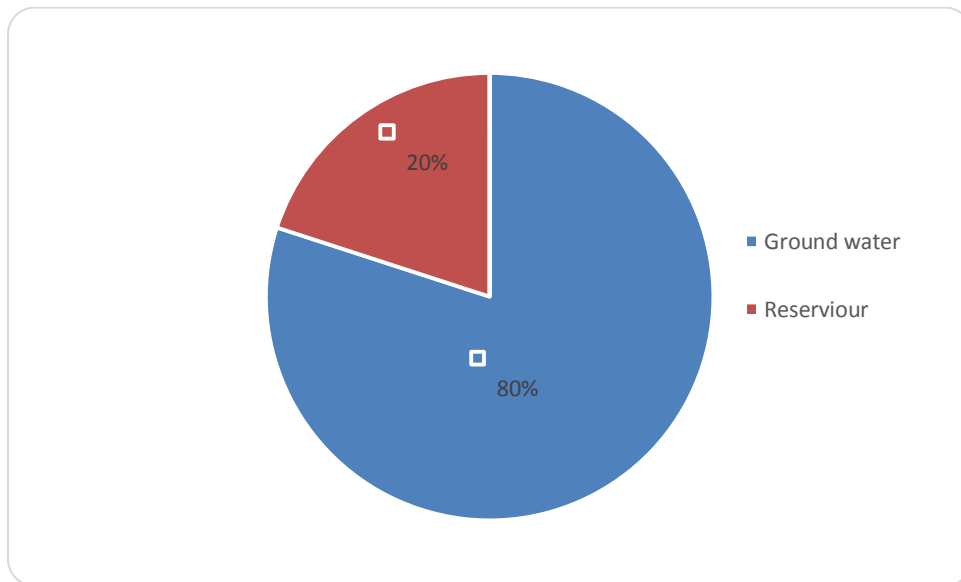


Figure 1: Source of water for green house consumption

Green house require water for irrigation, cooling, pesticide application, root zone media preparation and clean up. One-hectare green house has the potential to use between 120000 and 160000 liters of water per day. The majority of this water is used for irrigation & its rate of use is dependent on the level of solar radiation, green house shading air movement in the green house

and types of plant grown. The water is provided for the flower farms especially in the morning and night time (two times).

Amount of water used per hectare of Land.

From the data taken from Floriculture Farm professionals, it was estimated that more than 200 m³ of water was utilized per hectare of land as it was measured from the number of liters of water present in one thousand liters of tanker. Because one hectare of land utilizes more than 200m³ of water, exporting flower is similar to exporting water. Too much use of water leads to conflict with the local community; it may also lead to depletion of water from its natural reservoirs (SE Newmann, 2011). Per day a minimum of 5200m³ of water is utilized for all farms.

4.3 Related to human health

With regard to matters dealing with floriculture workers. Different health professionals states that there are negative health implications. For example, the absence of toilet facilities and their poor condition, absence of clean drinking water, showers, first aid and free medical care coupled with the presence of high temperature in the green house create potentially hazardous effect on workers' health. Chemical were seen damaging the health of workers. Skin chemical allergies, respiratory problems and unconsciousness because of inhalation of chemical are among the direct health problems associated with the chemical as witnessed by the health centers. In addition to these health problems as mentioned by health centers, the workers got early abortion in women, birth problems, stomach aches, vomiting and poor appetite (personal communication).

About usage of health protecting material and medical treatment before and after injuries.

From the data obtained from the company, the workers participating in the industry were delivered with personal protecting material such as gloves, goggles and other wearing materials but the workers were not volunteer to wear the materials because the materials were not comfortable when wearing. In relation with this, the production manager said that the company provides short trainings and written documents to increase the employee's awareness to their health. From the data obtained from the interview, the employees show feelings of pain because of the exposure for chemicals. The workers who are more exposed to chemicals were those who participate in chemical spraying activity.

Medical Treatment

According to the data taken from the company, there was medical treatment after and before injuries. For some of the workers, especially those who spray chemicals, additional health care was given such as milk and provision for better food. The interview result from the people in the surrounding area of the Flower farm indicates that the bad smell was recognized most of the time when the chemicals are sprayed at early morning. They were very dangerous for asthmatic people. The chemicals have the potential for contaminating organisms, soil and water. Due to their volatile nature, it was estimated that only 0.1% of the total applied pesticide will attain its intended goal. But the rest 99% leaves as an air pollutant. The pesticides applied in the green house travels an average distance of 1,500 miles causing significantly global warming and air pollution. (Anon, 2003). Tinaw Floriculture farm industry uses harmful or dangerous chemical because of its effectiveness, i.e. they can remove pests within short period of time even though it has some considerable side effects. Meer and Vander (1997) methyl bromide, an ozone depleter and a categorical acute toxin, is a heavily used and is among the most dangerous toxic substance known. Chemical pest control method increases soil salinity and destroying its productivity. Pesticides (which include herbicides, insecticides, and fungicides) can contaminate organisms, soil, water and other vegetation. It is estimated that less than 0.1% of the applied pesticide reaches the target pest leaving 99.9% as a pollutant in the environment (Mulugeta,2009).

Distance between the farm and the community

From the data taken from observation, the farm is found close to community. Fatuma (2008) studies that the Floriculture farms were seen very close and there were only <50 meter between the farm and road to densely populated residents of the area. The neighboring people were complaining on the pungent and irritating smell coming from the nearby farms especially while chemical spraying was going on in the green house. Most of the chemical spraying takes place in the morning times and the peoples were unable to eat their breakfast because of the bad smell coming out of the greenhouse farm.

Table 4: Social implication of Floriculture industry

Respondents	yes	no	total
Do you think that Floriculture industry has social impact	80%	20%	100%

From the result taken from interview, 20% of the respondents suggest that Floriculture industry does not have a social impact while 80% of the respondents agree that floriculture industry has social impact. Work place violence can happen on workers (Rogers, 2003) and it has many forms. Some are physical in nature and others are non-physical. Usually less attention is given to non-physical violence, which includes psychological, emotional and verbal (Rogers, 2003). Workineh(2007) study shows that workers sometimes experience health and safety problems due to long hours of standing in the green house causing their feet to swell and also causing kidney problem. Workers in flower farms need to have some knowledge about health and safety issues so that they know the safety procedures and take the appropriate measure. However, in most farms workers do not seem to be aware of the importance of occupational health and safety matters, e.g. how to properly use cutting tools and trainings is not provided about health and safety issues (Workineh, 2007).

4.4. Solid waste

This includes the plastics, cartoons and chemical containers. From the data taken from the respondents estimate, 90% of this solid waste were burn with incinerator at higher temperature (i.e.>80°C).The remaining 10% of the waste were burn with open air unsafely. This way of waste disposal has its own contribution for contaminating human health and the Environment.

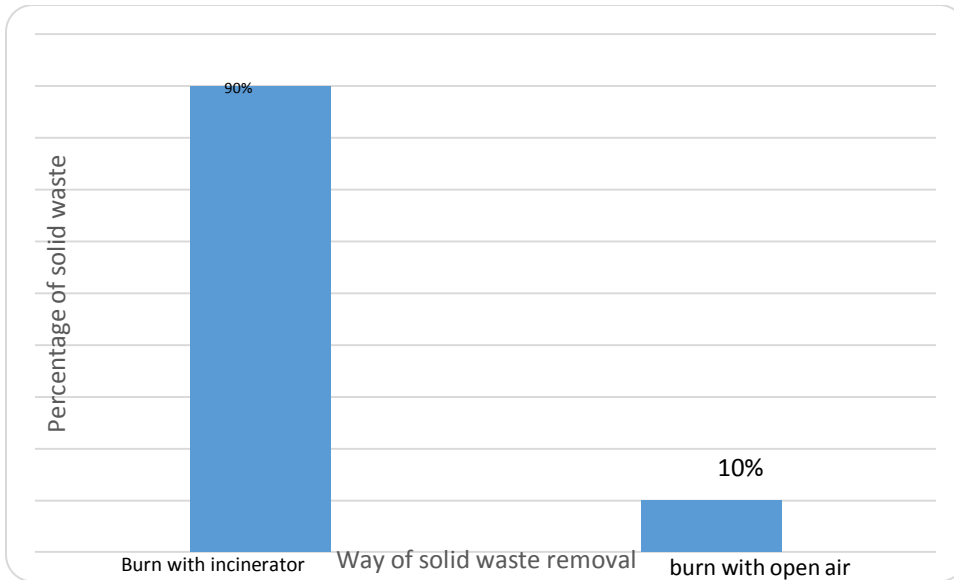


Figure 2: percentage of solid waste disposal

The other wastes which were collected from the company were green waste which includes remains from plants, unwanted leaf and stem. These wastes were collected before the flowers were packed. From the data taken from professionals, among the collected green waste, 10% of the green waste was utilized as a form of compost for their organic fertilizer need, 60% of the green waste is collected and ignored and the remaining 30% burn on open air as it was represented in the graph below.

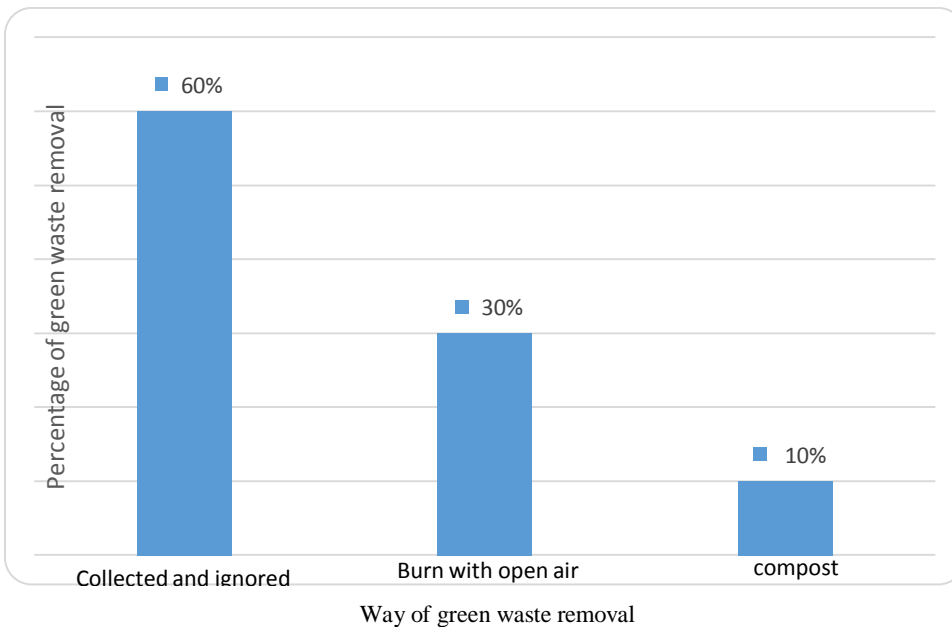


Figure 3: Percentage of green waste disposal

Table 5: about type of health related disease the green waste cause

Type of disease	Percentage of respondents
Respiratory disease	75%
Heart disease	5%
Other diseases	20%

From the data taken from the respondents, 75% of the respondents said that the green waste cause respiratory disease, 5% of them said that it causes heart disease and the rest 20% of the respondents said that other diseases are caused by the green waste.

4.5 Liquid waste disposal

Table 6: indicating how the liquid waste is disposed

Respondents	Recycled	Drained to nearby land
Liquid waste disposal	25%	75%

The advantage of using hydroponics as a media is enabling the farm to re use the water. But in my own survey of Tinaw floriculture industry, the farm recycle 25% of the planting media were from hydroponics, the other 75% of the liquid waste is drained to the nearby land as it was taken from the respondents. Graphically it was represented as:

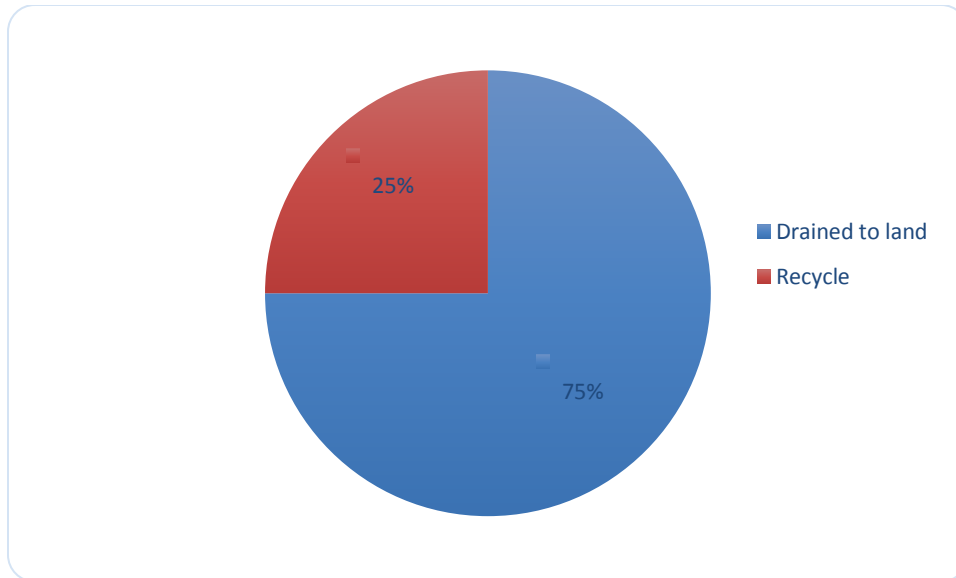


Figure 4: percentage of liquid waste disposal

4.6 Related to EIA (Environmental Impact Assessment)

From the data taken from professionals, Tinaw Floriculture Farm has its own EIA document which was given in 2006 when the Farm established. This was because the government gives more attention for the expansion of Flower industry and encouraging this new emerging industry to be stronger. But the document was not reviewed regularly. According to proclamation number (295/2002) Environmental Protection Agency has been given particular responsibility by the government. In this regard, the EPA has taken the necessary steps and embarked on the establishment of an Environmental Impact Assessment System for Ethiopia including the preparation of Procedural and Sartorial Guidelines as a prerequisite for the approval of new development activities and projects. According to Jean (2003), SEA has to influence decisions; otherwise, SEA doesn't really fulfill its purpose. More often than not, a good SEA that reached the decision makes at exactly the right moment when the policy was going to be approved or during the process of preparing a plan or a program. If SEA, like EIA, does not influence a decision, then clearly SEA should not be undertaken.

Table 7: Interview result about the type of fertilizers the industry uses

Respondents	Yes	Percentage	No	Percentage
Do you use organic fertilizers	6	30%	14	70%

From the data obtained from Farm professional’s interview, 30% of the interview result shows that the farm uses organic fertilizers. The remaining 70 % of the result represents that the farm does not use organic fertilizers. Use of excessive amount of fertilizers and improper application of artificial fertilizers and pesticides may result in harmful chemical contamination of ground water (David, 2002). Fertilizers are significant pollution threats because of their high solubility and frequent application of large volumes of irrigation water (Thrupp. and Lori, 1998).

Table 8: Interview result of the respondents about the nature of the land use before the Floriculture farm was established

Respondents	Forest	Percentage	Farm land	Percentage	Other activity	Percent
What was the land use before the Floriculture farm was established	5	25%	13	65%	2	10%

From the above table, 25% of the interview said that the land use before the establishment of the industry was available for forest, 65% of them said that it was available for farm land and the rest 2% was used for other activities. Most of the local communities and previous land holders perceived and explained the issue of land use change in association with the shortage of agricultural products, fuel and construction woods and price increase as well as the rapid climatic change seen in the locality (Fatuma, 2008). They were stressing that because of most of agricultural lands were changed from forest cover and farm lands to floriculture farms, there were a shortage of agricultural products.

CHAPTER FIVE

CONCLUSION AND RECOMMENDATIONS

5.1 Conclusions

Economically the floriculture industry is playing a vital role and contributes a lot to the country's GDP but in the other side the country has its own environmental and social health impact due to the input the industry utilizes. The fertilizers, chemical, intensive use of surface and ground water, the conversion of wetlands and farm lands to flowers, the bad smell from chemical, the waste disposal to water bodies and some health problems which are visible in some workers. These are all the negative impacts of the industry which is analyzed by this research paper. The river around the flower farm was highly exposed to direct effluents of fertilizer wastes from the flower farm and the water quality of the river is changed and the eutrophication process takes place which is finally brings sever consequence to the environment. Ethiopia has environmental policies and laws, among these laws EIA is highly incorporated with the flower industry. The mandate and responsibility to regulate and execute the EIA is given to EPA, but in this paper analysis the EIA is not properly manipulated and exercised. To assure the environmental sustainability of the booming projects of floriculture industry, the introduction of SEA to country will flourish the way. SEA can do in a better way which EIA is unable to do. Individual project farm level EIA's may not be able to deduce commutative and long term environmental effects of such co-location while SEA will (CAMCO, 2011). This study revealed that the impact by flower farms is significant in the industry area and the project level EIA is unable to regulate and magnify the cumulative or the sum of the industries impact on environment. The need for SEA is a way to achieve the required environmental and developmental sustainability and make easier to analyze the cumulative impacts of the floriculture industries and to take measure.

5.2. RECOMMENDATIONS.

Floriculture industry highly contributes for environmental impact, the waste waters are drained to water body and the soil media which they plant the flowers are highly vulnerable for direct chemical contact and the workers are highly contaminated by hazardous chemicals. For better sustainable and conducive environmental sake, Floriculture industries must practice the following recommendation.

- ❖ Using hydroponic instead of soil bed was preferable.
- ❖ Use of Environmental friendly agro chemicals was highly encouraged.
- ❖ The wastewater has to be recycled and treated.
- ❖ Incinerator has to be used to remove all the solid waste.
- ❖ Health and safety trainings to workers were highly encouraged.

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APPENDIXES

Questionnaires to be filled by floriculture staff members

My name is Solomon Nigatu and I am a post graduate student at Addis Ababa University from department of Zoological science. I am carrying out research in social and environmental impacts of Tinaw floriculture industry in the surrounding community.

The questionnaires are designed only for this research, so you are kindly requested to fill the questionnaires.

Thank you in advance for your cooperation.

Related to water resource

1. What is the source of water for your flower farm usage?
River or lake ground water
Reservoir other
2. How many meter cubed of water is used per one Ha of land?
30-100m³ more than 200 m³
100-200 m³
3. How many times does water is provided for flower per day?
One time three times
Two times more than three times
4. Is there any type of irrigation mechanisms which can save the loss of water?
Yes No
5. If yes what kinds of irrigation system do you use_____?
6. How many liters of water used per day for all farm?

Related to soil

7. How the flowers were planted?
Directly to the soil using hydroponic mixed pot bed
8. How many hectares of land are planted with soil bed, Pot bed or HP?
Soil Bed pot Bed
Hydroponic
9. Why do you choose Harmful / dangerous chemicals?
Effective
Cheap

10. What is the estimated amount of soil fertility rate after chemical utilization?

When the farm begins

After a year

Recent status

11. What is the source of your energy consumption?

Electricity

Generator

Both

Related to human health

12. What kind of visible health impact and injuries appears on workers
_____?

13. Are the workers properly using health protecting materials?

Yes

No

14. If yes what are they _____?

15. Is there any medical treatment after and before injuries?

Yes

No

16. How many meters is found between the farm and the community?

<50m 50-100 m >100

17. At which time does chemical spraying takes place?

At the morning

In the afternoon

At night

18. What is the problem when it takes place at this time?

Related to waste disposal

19. How and where the solid waste is disposed?

Buried

Moved to permitted open area

Disposed on land

20. How and where the liquid waste is disposed?

Recycled

Drained to land

21. What kind of visible impact does the waste bring to the surrounding environment?

Related to Environmental Impact Assessment (EIA)

22. Do you have your own EIA Document?

Yes

No

23. Does EPA properly regulate and review your activity?

Yes

No

24. If yes how the EPA follow up your activity?

25. Do you have your own environmental specialization?

Yes

No

26. Do you use organic fertilizers?

Yes

No

27. What was the land use before the farmland established?

Forest

Farmland

Others