Subsistence agriculture and Global Warming

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Abstract. Global warming and overpopulation are one of the most pending problems that needs to be dealt in the present days to aim for the bright future, to overcome hunger and poverty. For today the issues related to Global Warming and overpopulations are in incline. As time passes the more problems occur. It is well known that agriculture and Global Warming worsens the environment similarly. Agriculture has a vast influence on Global Warming, around 30 percentage from total. And similarly, Global Warming has the impact to agriculture. However, it was stated that small farms will be troubled the most, whereas larger farms will produce more and more product no matter what. Therefore, the article aims to describe subsistence agriculture and the effect it will have from Global Warming as well as it influences on the emission of greenhouse gasses. Common contributors of greenhouse gasses will be described such as: residue burning, usage of synthetic fertilizers, manure management etc. Also, the approaches that can help small subsistence farmers to withstand future difficulties. The concept of agroecology was briefly depicted, by outlining the significant parts of the approach.

1. Introduction
With the emergency of new technology and new products future seems bright. However, there are issues to be dealt with in the future and at present days. The three main challenges, that humans will face in the near future are Global Warming (GW), overpopulation and poverty. These future challenges will or have already various influences in different countries. Therefore, individual approaches will be in need. This article looks into agriculture and the need for transformations that needs to be put in action in achieving better practices [1]. The focus of the article will be done on subsistence agriculture and the impact that they will have on the occurrence of the challenges.

The first challenge for humankind is the excessive emission of CO2 eq into the atmosphere. The excessive emissions contribute to the dramatic changes in the planet (environment). Temperature rise is one of the main components of GW and it is fraught with consequences, which can be divided into three types. The first one is, some of the consequences are known and happening at the moment: the rise of the level of sea, drought, wildfires, etc [2]. Then, there are also predicted impacts of the temperature rise. And lastly, the consequences are unknown at the moment but will occur in the future. Thus, an early-stage preparation and adaptation for the coming changes will have a beneficial effect not only to climate change but also on the way of living.

Overpopulation and poverty can be directly related to each other. With the introduction of GW to these two, the problem gets worse. It is known that GW has a great influence on agriculture and
production rate [3]. Similarly, Agriculture is accounted for approximately 28% of the emission from the total emission. The dilemma starts when overpopulation requires more food to be produced, but then agriculture increases the influence of GW on itself, meaning the more food is produced the more influence it will have from GW [4,5].

Sustainable agriculture is to be a desirable solution to the awaiting future. There are some attempts made for improvements and integration of new technologies in the field. These attempts are called for both reductions of environmental issues and increase yield. At the moment, these measures only decrease the influence on the environment by introducing elimination of unwanted waste, in other words, optimizations (less fuel usage, minimization of human errors, lessening loss of yield, etc.). Such methods fight symptoms, but not the disease itself.

It is believed that due to the GW, the poorest countries will suffer the most, and especially will be in insecure small subsistence farmers. While larger corporations will increase yield by any means, smaller farms will suffer from temperature change. For some of the family’s subsistence agriculture are the main source of income and food security. A conducted survey reviled that around 2.7 million farmers (a large portion of the total amount of farmers) are engaged in subsistence agriculture. Meaning that by the increase of temperature these farmers will suffer from GW and due to that the production rate will decline. Another specific problem facing the three above mentioned problems is water shortage. Water availability can be a key factor restricting the higher rate of production in agriculture. Most of the available water is used in irrigation. Meaning that with the increase of population the values of water usage in irrigation need to be doubled.

2. Agriculture and new approaches

With the changing world, agriculture needs to be in step with the new technologies to face the difficulties and to withstand future challenges [6, 7]. As it was mentioned before subsistence agriculture and in general agriculture needs to be reconsidered in terms of its productivity, usage of technologies and the effect on Global Warming. Therefore, the following work will outline the methods that are out there, which can be applied to eliminate issues or improve for future needs. It’s obvious that there are plenty of practices that can be applied directly to subsistence agriculture for the improvements, but due to the different locations of subsistence agriculture it’s hard to receive the same results.

It was recognized by the IAAKSTD (The International Assessment of Agricultural Knowledge, Science and Technology for Development) that the well-established norms (approaches) in agriculture needs to be reconsidered and the future of it lies in biodiverse, agroecological-based farming that can meet social, economic and environmental goals as well as maintain and increase productivity. Therefore, the paragraph will outline agroecology and the usage new technologies.

Agroecology is more and more recognized as the way forward for agriculture, capable of delivering productivity goals without depleting the environment and disempowering communities. Agroecology, which uses ecological concepts and principles for the design and management of sustainable agricultural systems, has consistently proven capable of sustainably increasing the total output of diversified farms and has far greater potential for fighting hunger, particularly during economically and climatically uncertain times [8]. Agroecology in simple words is a mechanism that unites all systems together in harmony and resulting a less harmful way for nature and meets the productivity within its ability. However, that mechanisms also need integration of new technologies to meet the demands.

The main three mechanisms that are required for digitization and further progress in agriculture are the Internet of Things, nanotechnology and digital education. In the present day, Precision Agriculture (PA) is used for improvement and digitalization in farming. PA is considered one of the main elements of the third wave of the modern agricultural revolution. The first revolution in agriculture occurred at the beginning of the 19th century with the advancement of machinery. The second one came at the end of the 20th century with the occurrence of genetic modification methods and it was named as Green Revolution (GR). The second revolution or GR, with its advantages, also brought some drawbacks. The negative influence on the environment is associated not just with an increase in GHG emissions but also with land degradation, which makes it barren for future crops. Therefore, the need for the eco-friendly
approach is required and PA is a promising integration. The development and implementation of PA differ in different parts of the world. The method was first utilized in the USA, Canada and Australia. Likewise, UK, France and Latin America followed. Summing up, the new approach is in the demand, to sustain the future needs, with the population rise and Global warming [9].

3. Major fields contributed to Global warming in small subsistence farming

It is believed that large farms emit a great amount of GHG. However, small farms are also related to Global Warming. There are many ways of the contribution of small farms to the GHG emissions. The following paragraph will outline some of the main contributors to Global Warming.

One of the contributors to Global Warming in large and small farms is burning residues. The damage to Global Warming will depend on the amount of the crop. The gathering process in the farms depends on the scale of the crop and usually in larger farms the process is automated while smaller farms generally use a labor force. In both ways, the residues of harvesting are left on the land and therefore burned on it. This way of disposing of is considered both natural and traditional, but yet it has a harmful effect on the environment and health.

The main aim of any large or small farm is to increase its yield. Therefore, to increase productivity or yield synthetic fertilizers are utilized. These synthetic fertilizers are nitrogen-based fertilizers, which when used give a higher yield as mentioned earlier. Although emissions occur even with no cultivation, it is due to the natural emission. Nitrous oxide is formed as a byproduct of microbial activity, which is a process of nitrification or denitrification.

It is well known that livestock also is part of farms. Livestock also influences global emissions. The first one is related to enteric formation (natural gasses). Animals that contribute to global warming and the release of methane CH₄ into the atmosphere are called ruminant animals such as: (sheep, goats, camels, etc). They have a unique digestive system, which differs them from other animals and allows them to digest coarse plant material. As a result of first comes the second part that has an impact on Global Warming. In other words manure management. Emission is produced when the manure is in a solid, slurry, or liquid state. In all states, after excretion, biodegradation occurs and the formation of gases occurs. Carbon dioxide and methane are the key gases from manure [10].

To conclude, there are other contributors to Global Warming. However, the main contributors are considered the beforementioned: residue burning, synthetic fertilizers, etc.

4. Conclusion

In conclusion, the need for improvement in the small farm is essential as it would help to withstand future challenges, which are directly coming from both Global Warming and overpopulation. This work looked into some major problems that will bring Global Warming and overpopulation to small farms. There are new approaches to be used to lessen the impact on emitting greenhouse gasses and approaches to maximize yield and productivity.

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