Eco-technology and Environmental Science Department of Engineering and Sustainable Development

Review:

Environmental impact of war technology and prohibition processes

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Student:

Saloume Bazyan

Supervisor:

Erika Schagatay

Östersund, Sweden

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Abstract

Nowadays humans struggle to supply and attain longer and more appropriate life time. Introducing new technologies, which, speeded up by modernization and industrialization, is the main subject in many branches of science to improve the human's life; but this rate of innovation is not always pleasurable. As seen in many cases, side effects of using new technology come up as warning signs, and lead to huge environmental and humanitarian disaster with irreversible impact. Moreover, most of these technologies might be applied in different kinds of warfare where nations use high-Tech as tools to reach other's resources and raise their economic benefits. As in most wars that happened in the world, updated technologies have been applied to overcome the combatant, which finally shows up as damages on the environment, economy, civilians and soldiers. In this study we reviewed the reasons of shaping warfare and its consequences in different aspects of environment, civilians, soldiers and economy. The questions I followed to answer were: What are those main factors that induced by technology to form different kinds of warfare? And, can technology be altered as a tool to make a war more environmentally friendly? To answer these two main questions, we need to know reasons for shaping warfare a) Economy, b) Ideological/religious, and c) Power/pride/love which raise many theories such as Economic, Behavioural, Evolutionary, Demographic, Rational, and Political science theory. In 1990 members of the committee of environmental issue discussed development of technology in the future which should follow by consideration of global environmental issue. Therefore, new technology should bring solution to environmental problems. Nowadays technology creates some kind of competition, not only in combat, but also in cold war. According to reviews of many studies, the harshness of war increases and the aftermath becomes more severe on the environment and societies, consequently irreversible rehabilitation in short and long term. Applied technologies in some warfare have been considered by their impact on natural and human environment. As a case study I considered the recent war in Libya and its consequences, not only in the country, but also its impact on other nations and neighbours as well. Strict international laws is needed to explicit and declare the rights of each individual and nation to prevent and ban any activities in the term of war crime. Also groups of authentic authorities should set up to conduct an investigation into each activity in countries and survey on introduced technologies to ensure them about their result and consequences. Finally some reviews were released about how international committees and conventions, declarations and agreement has been set to prevent and prohibit crime in wars, and some international laws has been brought to guide nations about their rights and responsibility against each other.

Introduction

- *Goal and Scope*

Notwithstanding the effect on the environment, day to day we face tremendous amount of technologies which are introduced to the market; such emerging technologies include nanotechnology, cognitive science, biotechnology, robotics and artificial intelligence. Inadvertent consequences are the common problem in the field of technology and its design. Such invention is complex because of many acts and reacts which happen between parties and the consequences of introduced technologies are not predictable if humans are involved too (Joy, 1994). Arguments on this emerging technology show that however there are benefits from technology, extinction of humanity should be considered. Debate on the ethic of technology is in paradox with environmental ethics; technology ethic focuses on beneficial side of technology and wishes to raise human life fitness, and the other argument debates on the risk of living (Bostrom, 2002). Here I followed progress to answer two questions: What are those main factors that induced by technology to form different kinds of warfare? And, can technology be altered as a tool to make a war more environmentally friendly? Hence considering the environmental impacts raised by new inventions should be a principle before technology is introduced to the markets, even though in many cases technologies are altered to shape big catastrophe, such as the atomic bomb, microbial and chemical bombs, introduction of chemicals in the age of industrial agriculture and so on. Thus strongly requests for establishing one international committee feels more which invest more on how it is going with technology and consider all consequences of high-Tech devices in the case of environmentally friendly. According to these ideas some questions come in to the mind: How does technology shape different kinds of warfare? How does technology have pro and con effects on the environment? Can technology be converted as a tool to make a war more environmentally friendly? Can interferences on war by technology be limited?

- *History of warfare*

Accessibility to resources and inappropriate distribution of energy sources provokes humanity to ignore any ethics and aesthetics in order to seize other properties by greed and avidity. During the human life history we have observed different kinds of warfare by different conditions and peculiar preconceptions. The warfare dated almost from 12000 B.C where the people in Nubian died by violence and it continue up to now that thousands of people are killed every year by different reasons. The term of war applied for kind of behavioural pattern which exhibits by primate species including man is even applicable for ants; it is the organised conflict between

two or more parties (Nelson, 2006). It seems that around 90- 95% of known cities were involved in war and they fought continuously (Keeley, 1996). Despite that most documents showed a decline in armed conflicts since the end of the twentieth century, overall, declines set into the stable equilibrium (Hewitt et al. 2010). But the question is: Does the effects of recent wars on the environment also decrease?

Warfare is not limited to specific continent or country; Congo war, Ethiopia & Eritrea in Africa, Pearl Harbour (WWII), World Trade Centre explosion in America, World War I, World War II in Europe and Afghanistan war (Figure 12), Hiroshima & Nagasaki nuclear explosions, Iraq & Kuwait, Vietnam War in Asia are some examples of war all over the world.

- *Motivations for war*

Depends on which side you are considering, motivation is different for those who undertake the war and for those who order it. This is a time that we are under control of our habits, our economic system and our desires; therefore competitive needs are imperilling our civilization (Joy, 1994). The motivations which two sides have to start conflict are based on different conditions a) Economy, b) Ideological/religious, for example World war II, which was based on Hitler's ideologies and c) Power/pride/love which raise many theories ranked as following: Economic theory (Germain, 1955), Behavioural theory (Durbin and Bowlby, 1940), Evolutionary theory (Montagu, 1976), Demographic theory (Waugh, 2000), Rational theory (Fearon, 1995) and Political science theory (Mathur, 2001).

- *Types of warfare*

Different kinds of equipments and instruments have been introduced and used in wars and shaped different types of warfare. Conventional warfare expresses reducing an opponent's military capability through open battle (Janos, 1963), Unconventional warfare (achieve military victory through acceptance, capitulation, or secret support for one side of an existing conflict), civil warfare -war between factions of citizens of one country- (Fearon, 2007), nuclear warfare (Solomon and Marston 1986) and asymmetric warfare which explains conflict between two populations of different levels of military capability or size (Stepanova, 2008) are examples of combat which take place between two opposite sides.

  - *Warfare environment*

Warfare is named by the environment or the area in which it is taking place. This means that two kinds of warfare, conventional and unconventional, affect an area according to strategies and

region which they need to perform and it could also be vice versa: that types of environment changes the type of warfare.

Some examples of conventional warfare named by environment are: Jungle warfare, Arctic warfare, Mountain warfare and urban warfare. Examples of unconventional warfare include Psychological warfare, Biological warfare, Electronic warfare and nuclear warfare.

- *Effects of war*

Wars are not just limited to the battle area but can be more widespread. War affects both natural and human environments. Effects on soldiers, civilians and economy, and on the other hand impacts on natural environment, are just starting points to look further into consequences of war (Figures 1, 2).

Figure1: Iraq war, loosing family. Stella's Magazine 2011

Figure2: Kosovo war; Goran Tomasevic, Reuters

Figures 1 & 2:

Homelessness, losing families and famine, effects on public health and destruction of cities through bombarding, are some example of war effects on civilian, soldiers, and economy.

- *Effects on Soldiers, civilians and economy*

As an example, documents indicated that 8 out of 60 million soldiers were killed in World War I, and 22 million were disabled or severely injured (Powell, 2002); In the book "On Killing", Lt. Col. Dave Grossman stated that more soldiers were killed between 1500-1914 by Typhus than by military actions (Grossman, 1996) (Figure 3). This amount is because of medical equipment, or otherwise more soldiers would be dead from disease and infection. Moreover, effect also comes to population; as it is clear in World War II over 40 million civilians died (Baum, 1986) or in the

Figure 3:

Effects of war on soldiers are demonstrated by homesickness; die in war because of disease and conflict. World War II, 1941

Thirty years' War in Europe roughly 30% of the German population decreased (Grossman, 1996).

Another example of huge effects on civilians happened in the War on Terrorism or World Trade Centre explosion, which plum dust from airplanes colliding with the twin towers, consisted of toxic substances (Figure 4). Risk of many disease such as mesothelioma, asthma and bronchial increased among those who were close to the explosion.

Figure 4: Spencer Platt/Getty. Images, 2001; World Trade Centre explosion which plum dust from airplane collisions with the twin towers, consisted of toxic substances.

Economy in war has been considered from different aspects. One is that after war, losing nations should pay to repair all damages on victorious nations (Figure 5). Also war stimulates a country's economy like World War II which brought lots of benefit for America in the great depression period. But in most cases war just damages the economies of the countries involved.

Figure 5: effects of war on the economic system; the economy will be affected by destruction of city and sanitary facilities and repairing of all damages by losing nations. Depression and damages to other countries economic system, Photo by deskof brain.com, 2011

- *Environmental effects*

Finally an effect of war on the environment comprises all damages and pollutants which affect air, water, soil and wild life. Ecocide, or killing the environment, severely impacts the environment in modern time. Environmental disturbances caused by warfare have been occurring for thousands of years. This degradation consists of using depleted uranium weapons used in Gulf war 1991, defoliation of forest in Vietnam's War or burning oil wells in Iraq (Figures 6, 7); degradation of infrastructure because of bombarding and contaminating of water systems in Afghanistan by bomb blast or damages from bullets, public service decreased by contamination of the water system by bacteria. Also shortage of cooking fuel increases by the number of trees, cut down by people (Adley and Grant 2003).

Figure 6: Oil spill disaster. Photo by Fanoos photo

Figure 6, 7: War affects environment by damages and entering pollution to water, soil and wild life.

Figure7: Army Corps of Engineers. Photo by Courtesy U.S.

Advancement in military technology leads to severe environmental destruction (Figures 8, 9) which is used by combatants and devastates biodiversity and forests mostly during modern warfare. On the other hand, the use of biological and chemical agents in warfare, disregards the environment and human health. For example Agent Orange (Figures 10 a, 10 b) used in Vietnam war 1962-1971 has been applied for defoliation of tropical forest and also destroyed peasant crops to deplete them from food supply. Moreover, this component has carcinogenetic elements, dioxin, affected public health such as birth defects, spontaneous abortions, chloracne, skin and lung cancers, lower IQ and emotional problems for children; but this chronic effects continued several years after war. Blood samples taken by scientists showed high dioxin levels (Adley and Grant 2003).

Figure 8: Photo by Michael Coleridge on 26 August 1967. Environmental destruction by advanced technologies used by troops

Figure 9: Flamethrowers were keys to vampire "mop up" efforts during the Vietnam War. Da Nang, Vietnam. Sergeant Robert E. Fears clears an area using his flamethrower 05/22/1970, NARA No C. http://www.allenginsbergdvd.com/twentysecondpageb.html 2005

Figure 10 a)

Figure 10 b)

Figure 10: a) New weapons were constantly being developed and used in Vietnam war 1962-1971. This was dangerous because researchers didn't take time to study the long-term effects. Poisons such as Agent Orange were meant to clear out jungles but ended up having a worse effect. Today may people both in America and Vietnam can be found with genetic deformities and illnesses (Honor American History, 2012. http://tschida.wikispaces.com/Maria's+1960's+Vietnam+War); b) Agent Orange sprayed by U.S. Army Operations; Squidoo, 2012

Besides the atomic bombs which were used in World War II, destruction of nuclear facilities damaged severely the public health and amenities. During Iraqi's war 2003 over two hundred blue plastic barriers which contained high level of uranium oxide were stolen. After dumping radioactive contents and raising up the barrier on the river, poor residents used this container for store food and water, or for transporting milk, or sold to other regions and villages. Leakage of these amounts of radioactive materials to the water and food, dispersing to the air and seeping to the ground has been predicted to be cause of death of thousands by Leukemia (Adley and Grant 2003).

- *Examples of war consequences*

As mentioned in the last section, effects of war in different warfare are obvious and no doubt that by civilization and introducing new technology these effects got severe with wide impact on human life. In 1998 civil war started in former Zaire, now known as the Democratic Republic of the Congo (DRC) (Figure 11); conflict began on water resources and political agenda.

Figure 11: Congo war; war led to decline in wildlife population and destruction of environment such as deforestation. Picasa 2011. https://picasaweb.google.com/lh/photo/JM9A3SR2i6ADuJGV_ZPN3w

Consequences of this conflict led to 3 million dead mostly because of disease and starvation (Figure 12); wide spread of sexually transmitted disease, decline in wildlife population because of hunting - especially in the elephant population for ivory poaching - and other destruction on the environment such as deforestation for fuel and farmland are some examples of 5 years of combat (Enzler, 2006).

Figure12: spreading disease and famine during war. Example of famine and starvation in Iraq war, National geographic

In Asia more than two decades of war in Afghanistan has led to severe environmental degradation; just in three Afghan provinces more than half of the forest has been destroyed. A team from UNEP's Post-Conflict Assessment Unit working with the Afghanistan Transitional Authority indicated that: "Three to four years of drought have compounded a state of widespread and serious resource degradation: lowered water tables, dried-up wetlands,

denuded forests, eroded land and depleted wildlife populations" (BBC NEWS, 2003). UNEP's executive director in that time also said: "Over 80% of Afghan people live in rural areas, yet they have seen many of their basic resources - water for irrigation, trees for food and fuel - lost in just a generation (Figure 13).

Figure 13: A farmer spreads fertiliser over his wheat field; Photo by Helmand Blog – Afghanistan.2010

In urban areas the most basic necessity for human well-being - safe water - may be reaching as few as 12% of the people"; these statements prove a mass destruction in just a quarter of a century.

We can name other wars in Asia, Hiroshima & Nagasaki nuclear explosions, as atomic war which atomic bomb discovered by Nazi Germany in 1938 was used by the American army in 1945 after World War II, beginning of the Cold war; the so called Manhattan project. On August 6, a uranium bomb by the name of Little Boy was dropped on Hiroshima, followed by a plutonium bomb by the name of Fat Man on Nagasaki on August 9. Massive destruction on urban areas and on the environment, thousands of dead civilians and thousands of casualties were the immediate consequences of this disaster (Figures 14).

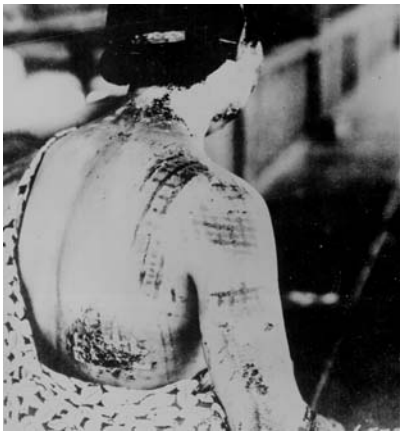

Figure 14: The patient's skin is burned in a pattern corresponding to the dark portions of a kimono worn at the time of the explosion." Atomic bomb survivor, Ca. 1945; 77-MDH-6.55b

Another example of environmental disaster has been displayed in Iraq & Kuwait or the Gulf war. War started by Iraqi forces; they claimed that Kuwait were extracting oil illegally from Iraq; one of the most environmentally devastating wars continued in which Iraq dumped one million tons of crude oil in the Persian Gulf (Figure 15). Huge damages came to migratory birds and impacts of marine life. Crude oil spilled up to desert as well and leaked to the ground water. Exposure to DU (heavy metal cause kidney damage), chemical weapons (nerve gas and mustard gas) caused many veterans to suffer from illness and many died of brain cancer.

Figure 15: oilfield field burned by Kuwait; Photo by Kevin Grandia. Posted 2010

Among the wars in Europe, World War I and II are the most known; the first started 1914 and during combat most damage to the environment were done by changing land use to establish trenches; digging trenches caused trampling of grassland, crushing of plants and animals, and churning of soil. Erosion resulted from forest logging to expand the network of trenches (Figure 16). Soil structures were altered severely. Over 9 millions died by outspread flu, application of poison gas on soldiers in trenches, and after awhile these gases evaporated to the atmosphere (Figure 17).

Figure 16: during World War I, troops changed land use to establish trenches; digging trenches caused trampling of grassland, crushing of plants and animals, and churning of soil. U S Navy Seals, 2010

Figure 17: Over 9 millions died by outspread flu, application of poison gas on soldiers in trenches, and after awhile these gases evaporated to the atmosphere. World War I, Cliff Chadderton, 2008

Also in World War II (1941) over 1 million people were killed in gas chambers (Figure 18), pesticide produced by Nazi's firm killed people in large numbers. In the latter years of war, hunger winter, shaped by allied who attempted to liberate Western Europe. The results of this act and reaction by German responding by putting embargo on food transport to the west troop caused approximately 20000-25000 Dutch to starve to death (Enzler, 2006).

Figure 18: Bones of anti-Nazi German women still in the crematoriums in the German concentration camp at Weimar, Germany, taken by the 3rd U.S. Army. Prisoners of all nationalities were tortured and killed." Pfc. W. Chichersky, April 14, 1945.

- *Case study Libya war*

Libya, located in the north of Africa, suffers as other developing countries from environmental degradation. Desertification, deforestation, shortage of fresh water sources, overgrazing, poaching, water born disease and many other environmental problems are some examples of current environmental issues in Libya. These issues could be worse if the country has an unstable governing situation. As happened in most wars, environmental degradation and crime against humanity spread all over a country affected by war. Here we discuss about what has happened in Libya during war followed by some example of war consequences.

War in Libya is categorized as civil war; Applying modern technology, using new methods to overcome on violence and getting support from other countries which intervene and focus more on their benefits of economy, are the major concern to extend and expand the war and maybe affect other countries and neighbours.

Lack of essential infrastructure for environment protection and pollution prevention by the national government is a big danger for natural resources and it becomes a disaster when such a country enters war, and this is a fact for Libya. Severe shortage of drinking water followed by contamination in fresh water, is the main problem that Libya is facing, and careless government has no plan to prevent contamination of fresh water thus it became as useless resource. Providing food due to shortage of fresh water resource is another concern. Fresh water declines every year by low amount of rainfall; any further damage in water supply by oil or other contaminant can lead to relying on other country's resources for basic food demands. A majority of Libyan people suffered from economical depression. On the other side Libya is under the project of building a system of aquifers under the Sahara desert to supply coastal regions with drinkable fresh water, but it is unclear how much this can affect the process (Figure 19). Radioactive uranium is the other concern which USA and Russia perused Gaddafi to stop, but he denied. Radioactive

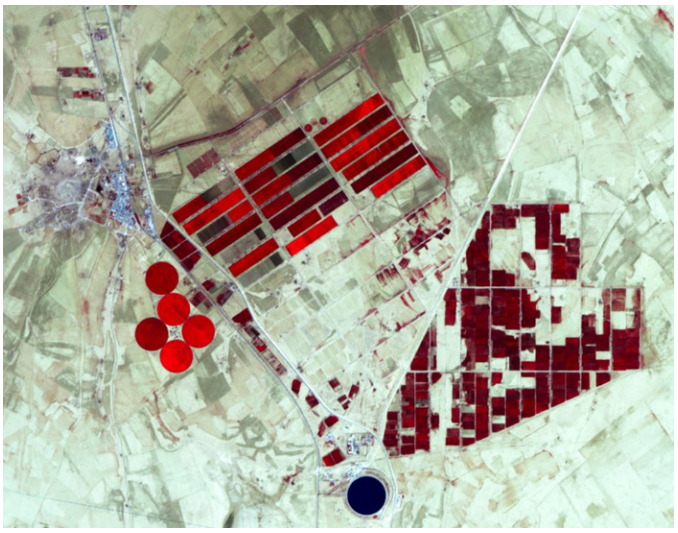

Figure 19: NASA's false-colour image of the Grand Omar Elmokhtar Reservoir Project. Vegetation (red); buildings (gray); bare ground (beige); water (dark blue)

equipment under any reason is dangerous for the environment as we saw in Japan earthquake and tsunami.

Libya is an oil rich country and any turmoil on that from government, such as burning oil wells, could cause an enormous disaster on air and water - the same thing that Saddam Hussein did in the Persian Gulf War. This pollution would come directly to terrestrial and aquatic animals, birds and humans. Pollution from the air in the shape of fumes finally ends up in lakes, rivers and oceans far from the site of fire (Figure 20). Loose of barrels and decrease in none renewable natural resource seriously affects human life (Rossillo, 2011). This source of energy is the major

states income that gains from oil production. Also global oil was affected by Libyan war which exports of crude oil decreased during the conflict. It was not that important as Iraq war and amounts of oil export by Arab states in Persian Gulf. That is because crude oil used for gasoline but another one used for fuel (NewScience, 2011).

Deserts occupied by troops have shown other environmental turbulence. The west mountain of

Figure 20: by burning oil well pollution from the air in the shape of fumes finally ends up in lakes, rivers and oceans far from the site of fire Libya war, 2011

Libya shaped by continually flat coastal plain and the cliffs act as a natural defensive border for Libya. There was no sign of human activity in this part of the country before war, but right after it started, deserted roads filled up with huge amount of vehicles and soldiers (Figure 21).

Figure 21: Occupied desert by military. Photos by Jonathan Levinson for NPR. 2011

Modern weapons after forcing back Gaddafi by rebels came in their hands; finally they used these modern equipments in fighting such as U.S. Navy practice rounds (Lourdes Garcia-Navarro, 2011) (Figure 22).

Insecurity at the borders both from drug traffickers and terrorists and huge number of young people without any job handling weapons by hand, also causes unwanted involvement from the other sides and

neighbours (Thomson Reuters, 2011).

Figure 22: Modern ammunition cached by rebels. Photos by Jonathan Levinson for NPR. 2011

The opposite side of Gaddafi's men was made up of civilians, such as teachers, students, lawyers, and oil workers, and a contingent of professional soldiers that defected from the Libyan Army and joined the rebels (Lourdes Garcia-Navarro, 2011). Influx of arms also cause criminality and insecurity in business functioning and its effects the other country's economy system; such as the French nuclear sector that is supplied by the Areva company, who works on uranium mines in the northern town of Arlit (Reuters, 2011). Mass killing of prisoners, torture, enforced disappearances, and arbitrary arrests are examples of Gaddafi's abuse described by an international human rights organization (CNN Wire Staff, 2011). Raping of women by Gaddafi's orders, and encouraging troops using Viagra-type medicines to engage them in sexual attacks, is also part of war crime against humanity (The Huge Justice Portal, 2011). The international criminal court estimated that 500-700 people were killed by the government in February 2011. By the end of February food, fuel and medical supply decreased tremendously and the International Committee of the Red Cross asked for a budget for emergency help to those injured in Libya and more than a million people needed help or had to flee (Simons and Farquhar, 2011; BBC, 2011).

Moreover, getting advantages from situation during the war in Libya by other country extended the violence there. Due to decreasing in ammunition from Great Britain and France, as main combatant in war, German government took this opportunity to introduce German bomb and military technology for the war. As the war against Libya started few hundred days ago, NATO sent more than 5000 air strikers and now German Defence minister stated that they are ready to deliver "50 bomb bodies" to NAMSA; those are casing as well as guidance system for modern air-to-surface bomb! But this happened when on one side the German government refuses to join NATO mission and on the other hand they send equipment to participate in war (World Socialist Web Site, 2011). Gaddafi also hired 300-500 soldiers from EU countries with high salary who were more willing to kill rebels than Libyan soldiers, because they had taboos to prevent killing people from their tribes. Overall Gaddafi used civilians to protect himself and his military setting up the military facilitates close to civilian facilitates and using them as a shield (Waghorn, 2011).

Almost one year after war in Libya, there is still instability in the country and after ousting Gaddafi, those western countries that intervened in the war, did not attempt to improve the

situation. The National Transitional Council (NTC) refused any opinion about getting help from outside of Libya to stabilize the country because of fragmentation and restarting conflicts (Larison, 2012).

Method

This study reviews many researches and statements have done on war technology and its consequences specifically on environment. In this study data were gathered from different sources such as internet, newspapers, books and media. Many sources could be updated therefore after years access to those mentioned WebPages might be limited.

Results

Quality improvement of livelihood and many factors of expectancies are known as innovation and those are promoters for scientists to enhance technology inventions. In the second half of the nineteenth century, land warfare was under control of new technologies. Rifled weapons, railroad, telegraphic communication rose armies to strike casualties on each side (Moran, 2001). Although at the beginning, development invents welfare for humans but in most cases converts to the tools as genocide - violent crimes committed against groups with the intent to destroy the existence of the group- (United States Holocaust Memorial Museum, 2012) and ecocide - Heedless or deliberate destruction of the natural environment, as by pollutants or an act of war- (The Free Dictionary, 2012). Benefits from advancing technology will disappear after awhile as physics revolution at the beginning of 20^{th} century by producing the atomic bomb and it was followed by biotechnology due to producing biological weapons. Revolution in biotechnology consists of monoclonal antibodies, DNA engineering, and bioinformatics; those were applied to increase human lifespan; but by producing bio weapons which utilizes the elements of toxicity, new warfare shaped which known as bio defence against bioterrorism. In addition it motivates technology to develop more and more such as: medical approaches advanced in the fields of monoclonal antibodies, cell culture technology, genetic engineering, biosensor technology, DNA chip technology (Sutton, 2004). Thus as clear, technology was counted as a factor to initiate different kinds of warfare based on any reasons like economy or politics. Also it altered to such a good way of immediately transmitting information. World-wide network of communication satellites posed at the heart of these technologies which transfers data without any barrier in distance and time. This technology is also used in other ways to spread the information and cover all news about war such as the Gulf war where much information was captured by video and camera and additionally by computer. Most activities were visualized for receivers and it heightened visual attraction to the viewers (Heppner, 1993). Another example was those data by

Bin Laden transferred by email to receivers all over the world that kept him away from US government's eavesdroppers (Goldman and Apuzzo, 2011). One obvious example of using technology is the HAARP (High-Frequency Active Auroral Research Program) which were first introduced as scientific and academic research but in fact has been used for induced ionospheric modifications "as a view to alter weather patterns as well as disrupting enemy communications and radar". HAARP also has the ability to disrupt all electric systems and switch off power completely. As Rosalie Bertell indicated: "HAARP operates as a gigantic heater that can cause major disruptions in the ionosphere, creating not just holes, but long incisions in the protective layer that keeps deadly radiation from bombarding the planet" (Chossudovsky, 2009). Sometimes technology is used to mitigate terrorism effectiveness. According to Desouza 2007, different kinds of technology have been developed to overcome terrorism such as biological technologies, robotics, information technology, and nanotechnology; for example in recent years, because of terrorism, control board and immigration systems are applied more stringent and tighter. Identity card, fingerprints and facial biometric technologies are used to encounter with terrorism (Desouza et al, 2007). Moreover, during the war the process of technology advancement speeds up because of necessity in accelerating activities; like for example in World War I where the demand for creating faster and more powerful flying machines for accelerating sky activity was the reason behind the invention of Sopwith Pup and the French Spad SVII, then consequently Germany found that they should fill this gap on technology to overcome the war. Thus they started to produce massively new fast Halberstadts and Albatrosses (D types) (Figures 23 a, 23 b), armed with two guns (Gilam, 1993).

Figure 23: a) The French Spad SVII; b) Halberstadts and Albatrosses (D types). Invention of "The French Spad SVII" for accelerating sky activities in World War I, provoked Germany to produce massively new fast Halberstadts and Albatrosses (D types).

a) Sopwith Pup. http://pilots-n-planes ww1.com/Allied/British/Planes/Britishaircraft. htm

b) Halberstadt D.II. http://www.aviation-history.com/halberstadt/d2.htm

In Libyan's war environmental disaster has been shown in different faces, some because of other countries intervention and some because of domestic civilian war. As an example NATO-led strikes could cause massive disaster during war, if the "Great Man-Made River" were damaged. This river extracts water from depth of 500-800 meters beneath the Sahara, and it purifies and transports water to the north, the area with most concentration of people. In this case damage comes not only to the environment but also to economy and human life (WorldPress, 2011).

As mentioned, all above applied technologies in war are widespread and any nation and country try to arm themselves by high-tech and modern facilities to overcome other parties, show their power, raise their benefits and access more resources. In order to prevent illegal activity by nations that have undertaken conflict, there is a need for comprehensive and international laws.

Discussion and Conclusion

"A moral and political principle which states that if an action or policy might cause severe or irreversible harm to the public or to the environment, in the absence of a scientific consensus that harm would not ensue the burden of proof that falls on those who would advocate taking the action." -The precautionary principle- (BEC PROTECTS, 2012)

Environmental degradation such as desertification, deforestation, shortage of fresh water sources, poaching, water born disease and impact on civilians and soldiers are known as consequences of war. Environmental issues increase year by year and accelerate by human induces; introducing new technologies to the markets which in many cases become a tool after a while applied in different warfare, is one of the main concerns through environmental conservation and human environment. There are many laws and rules set by international conventions and committees in order to diminish and prevent further impact on environment specifically caused by humans.

In 1990 a committee of environmental issue (JSTP) was established that members discuss on future development of technology which brings global environmental issue to the account. In fact development of technological counter-measure should be considered at the same time of shifting technology to the way of solving environmental problems (Kubotera, 1996).

Christopher Frayling mentioned in an interview by The Listener stated (11 October 1984): "Until the middle of the century the force, the power, still resided in guns and in weapons. After the middle of the century the real power is in information. Even the atomic bomb is used today not as a weapon but as message. The fact, the happy fact, that it is not used means that it is not the bomb in itself which works: it is the continuous exchange of messages between powers" (Veryard, 1989). Domination in information technology creates new competition in the age of modernization not only in combat but also in cold war. By development of technology harshness of warfare increases and aftermath become more severe in order to environmental and social damages thus rehabilitation is irreversible in long and short term.

Greediness and seizing others properties, keeping all authorities in its own hands, depression and economic problems, running endless wars, destruction of environment and reckless energy consumption all are those factors which lead to unsustainability not only in contemporary period in our country or world but also next generation. Therefore we need to construct a better society

at the time now. But there is a question how we can minimize the acceleration of these destructions? Or how can we inform people about the harmful activities that are happening and will happen? How can we empower individuals to keep the control of their life, works, economy and the planet which we all share (Martin, 2011)?

The answer is hidden behind the face of "Triple evils" described by Dr. Martin Luther King, Jr. in 1967 as racism, militarism and economic exploitation (Martin, 2011). All these three factors associate with development of technology and enhance the new methods and approaches to access more resources and possessions.

People are those who are responsible for everything happening in their societies. For example revolution in Egypt by people represented by no violation movement against dictatorship, showed to any superpower that spending lots of time, money, using weapons and applying equipment to reach the desires is futile as Egyptian stood up and said "no more" to U.S. which tried to overthrow Mubarak by lavishing money, weapon and political cover. Such an example and event in other country shows that each individual can rise and join together and strongly request better solutions for any challenges in our life and for our planet. This could be happening continuously in the fields of medicine, food, energy, sustainability and terminate war (Martin, 2011).

As shown in Libya war, countries involved in war, tried to show up their new technologies in the field of weaponry. Prior to this Iraq war, eight years ago and also Iran-Iraq war displayed the high tech weaponry. Thus it could be concluded that modern warfare is influenced by a need to sell weapons to raise the economical benefits of a country. For example USA, France and Great Britain used large range missiles for non fly zones in Libya (Steen, 2011). On the other hand, those countries and also International committees are used to apply modern tech to overcome Gaddafi's men. In this case NATO used special bombs called vacuum weapons that do not give any chance for survival; but this act or other examples of destroying telecommunication by NATO forces were contrary to their believes to support the human rights. NATO's air strikes damaged systematically Libya's telecoms infrastructure for the reason to inhibit Gaddafi from further activity or maybe create opportunity for foreign countries to rebuild these systems; this damage followed by the disbursement of medical aid to the wounded, it disrupted fire fighters' activities and other humanitarian efforts also affected those non-military sites (Rozoff, 2011). Aftermath of Libya war has approved by the doctrine of "responsibility to protection" (R2P) that it justifies intervention. But responsibility to protect follows by responsibility to rebuild which none of the intervening countries accepted (Larison, 2012). All these examples show that lack of persistent law subdues economical policies and prohibits any activity against environment is favoured even by the United Nations.

International law has been used mostly after World War II to guide thought and activity, trying to regulate and uphold the peaceful world. “Peace Through Law” written by Hans Kelsen (1944) and “Forging a World of Liberty Under Law” by Ikenberry and Slaughter (2006), were the examples of classic and the latest iterative vision of international law. But here is the question that if law is useful or clear enough to prohibit warfare? International law is not applicable in some situations such as: UN Security Council supported NATO’s campaign in Libya; in some cases it is impotent (Iraq 2003, Panama and Kosovo) then the licenses turn to military violence which is useful at the time, and it is easy to prove its field relatedness -NATO involvement in military violence- when it can approve act of war. It emphasizes that international law is clout with the lack of lawfulness. Neither Human Right Watch (HRW) nor Amnesty International could stop the war in Iraq because this defence or political judgment is not in their briefs. Human Right Watch has a policy of silence on matters of laws on whether to wage war, focusing instead on violations of how war is fought. This group exceptionally is in the side of war if war is the only way to stop and prohibit genocides. This has happened in the time applauding NATO’s campaign in Libya; the executer of HRW named it as “nothing less than the type of unified and decisive action the UN Security Council has brought to bear in Libya” (Côte d’Ivoire, Foreign Policy article on 25 March). And later in the name of human rights they called US military for civilian security safety in Afghanistan to continue long term military occupation and later on it supported Kosovo and Somalia wars. International Law is influenced by the powerful states and should not debate on ethics, interests and consequences of war the part which was ignored in Libya’s war (Madar, 2011).

Based on all examples and descriptions about war and its consequences on environment and human life, demands more powerful laws which can prohibit the war between combatants. In this case lots of activities and conventions have been held. One of them so called Silver lining is international environmental declaration, same as Rio 1992, which condemns wartime environmental degradation. According to that strict mechanism and giving international support, international laws mitigating war’s environmental destruction, have this possibility to change the face of combat or discourage it from the beginning. The main opinion of that is when international environmental responsibility joins to strict international enforcement of war, crime and human rights could make war less stimulating for two sides of conflict (Adley and Grant, 2003).

ENMOD is one of the main conventions on “Prohibition of Military or Any Other Hostile Use of Environmental Modification Techniques (ENMOD) that prohibits using the environment as a weapon in conflicts”. This new tool basically applied to prevent usage of weapon in mass destruction. ENMOD was encouraged by global opposition in term of applying Agent Orange and environmental modification techniques during Vietnam War in 1960s (ENMOD institutes 2001). This convention defined “each state party to the convention undertakes not to engage in any military actions which use environmental modification techniques, having widespread, long-

lasting or severe effects as the means of destruction, damage or injury to any other State Party"; United Nations, Geneva, May 18, 1977, entered into force: 5 October 1978. US signed this convention but later on the military introduced HAARP which has the mass effect on environment and climate; also the same for Soviet Union secret army which planned to control global climate. This also happened before the time that Americans accepted the use of weather manipulation weapon to raise the rainfall in Vietnam in order to wash out enemy's crop; but there was no strict law to ban their activity and it excluded in Copenhagen CO15 despite it was explicit by ENMOD that "military or any other hostile use of such techniques could have extremely harmful effects on human welfare" (Chossudovsky, 2009).

The term of Ecocide came to international law since it categorized as the 5th international crime against peace alongside Genocide, Crimes against Humanity, Crimes of Aggression and War Crimes. Then under this law any individuals are responsible for their actions at last it will have extreme effect on government, head of states and corporations. Ecocide itself defined as "the mass damage, destruction to or loss of ecosystems of a given territory, whether by human agency or by other causes, to such an extent that peaceful enjoyment by the inhabitants of that territory has been severely diminished." This law against Ecocide could make government, society, business and any organization aware of the environmental degradation and spread peace all over the world if it becomes an international law (The Hamilton Group, 2011).

The latest activity in the field of international law is the term "The Rome Statute" which came to force on 1st July 2002. The motivation for this international law stems from the end of 19th century. In that time the international committee stepped forward to establish the permanent courts with supranational jurisdiction. By holding the international conferences in 1899 and 1907 the most powerful nations tried to harmonize the law of war and constrain any usage of technological advanced weapons. Many attempts have been carried out that finally a first draft was submitted in 1951 under subject of prevention and punishment of the crime of genocide. Lack of definition of crime aggression also geopolitical tension after cold war caused a delay in submitting draft statutes and studying related legal issues, but later on Trinidad and Tobago asked the General Assembly in 1989 to move again on these subjects and establishment of international criminal court which followed by sending a draft in 1995. The General Assembly worked two years on this draft and during this period the United Nations set up the ad hoc court that used statutes for Yugoslavia and Rwanda. Revisions came after pre-trial and trial. During its 52nd session the UN General Assembly decided to put together a diplomatic conference due to establishment of the International Criminal Court, held in Rome 15 June–17 July 1998 to define the treaty and that finally entered into force on 1 July 2002 (Poor, 2002).

Sustainability in warfare

As many documents declared, preventing warfare because of many reasons is impossible; but many conventions and declarations imposed situations to diminish the consequence of war. Principle 24 of the 1992 Rio Declaration states, “Warfare is inherently destructive of sustainable development. States shall therefore respect international law providing protection for the environment in times of armed conflict and cooperate in its further development, as necessary” (Adley and Grant 2011).

Michael Reilly says that “If you're worried about the environment but still need to blow people up, a new class of nitrogen-based bomb materials is for you”. It means that warfare in any shape and frame that we call never stopped; its consequences come to environment and human. Thus war is propelled to becoming more environmentally friendly! In this term, the Environmental Technology Verification (ETV) Program of the Environmental Protection Agency (EPA), expand testing protocols and confirm the performances of innovative environmental technologies which can lead to specific problems, endanger human health and natural environment (Environmental Protection Agency, 2011). According to this, most scientists try to devise new technology such as popular explosives, cleaner, more powerful and stable than other explosives. For example designing a devise of rocket fuel out of HBT or G2ZT which introduce ammonia to the air as they explode is a good idea although this could be used latter in a bomb instead of other components that form nitrogen oxide and cause air pollution (Reilly, 2008).

Using clean technology and considering the potential environmental impact (PEI) for any process based on output waste and energy consumption (Cardona, 2004) could be applicable to prevent invention of adverse technology. This technique is beneficial in any warfare which assesses how much noxious component might be entered to the environment during combat.

Nowadays we are witnessing tremendous effects of war on environment; these effects accelerate by invention of new techniques and equipments also intervening of other nations. Therefore, plausible diminish of these effects can be obtained by setting basic and general rules to prohibit and hinder inappropriate human activities. As discussed before there are huge amounts of conventions, treaties, declarations and judgments on law of war. It mainly started from 1856 with the Paris Declaration Respecting Maritime Law, followed by the First Geneva Convention (1864), Hague Conventions (1899), Geneva Convention (1949), Convention on Cluster Munitions (2008) etc, and continues still. Also some organizations which may be called up during each armed conflict to assist with mediating or remedying damage are: UNEP (United Nations Environment Programme), IMO (International Maritime Organization's), ICAO (International Civil Aviation Organization), WHO (World Health Organisation) and the International Committee of the Red Cross. Despite the long term legacy of environmental degradation caused by warfare and many attempts to halt and prevent any further criminality

against humanity and environment, lack of strict and exact principles on international law is obvious which in most cases are weak or not updated. Concern comes to fact when we encounter ecological or temporal constraints which should be considered in any agreement and statute, also credible authorities should be defined to impose penalty for those guilty violent groups. Finally preserving environment is worthy for its intrinsic value thus treating the environmental security should be placed in the beginning of each activity and decision making (Adley and Grant, 2003).

To sum up, I point out that: it is not conceivable to prevent warfare in any types because of political, economical and ideological reasons; the impacts on environment, economy, civilians and soldiers manifest all about war consequences; there is severely impacts on natural and human environment which accelerated by development of technologies; the connection between war and technology seems to be as a loop; which it means that war motivates invention of technology to accelerate and empower involved parties in war; and from the other side, technologies pushes war to run forward and make more benefits in many aspects such as economy. Many committees has been set up and many international laws, statutes, declarations and conventions were defined to prohibit and halt war; but in many cases usefulness and unclear laws let nations to continue their violence in term of war conflict. Therefore there is a need to have international law which clearly defines what the right of nations is and to what extent, also what are the appropriate human activities. Also according to what mentioned above, Environmental Technology Verification (ETV) Program is a good plan to observe and confirm innovative technologies which are more environmental friendly. Overall, authentic authority who brings and supports applicable laws for any situations before, during and after war, is needed besides all activities which has been done up to now to prevent, prohibit, halt and ended wars.

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