

Exploring the Impact of Climate Change on the Outbreak of Early Twenty-First-Century Violence in the Middle East and North Africa and the Potential of Permaculture as an Effective Adaptation

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ABSTRACT

Considering the ongoing violence taking place in the Middle East and North Africa (MENA) region, especially within Syria and Iraq, it is essential to provide an accurate explanation of causes in order to develop an adaptation model. In addition to discussing the climate-related concerns associated with the emergence of violence, this paper considers how tackling the environmental crisis in MENA will improve living standards and lead toward sustainable development. As a supplement to a range of secondary data, a small selection of individuals who have escaped the recent conflicts have been interviewed. Because this potential sample pool is small, and the ongoing violence precludes fieldwork in the MENA region, this study provides only a preliminary exploration of the topic. A more detailed study is desirable, if and when it is feasible to conduct such research. As a potential adaptation to climate change in the region, permaculture is presented through illustrations of its capabilities for redressing some of the underlying causes of violence in the MENA region.

1. Introduction

Since the beginning of the twenty-first century, there have been enormous armed conflicts occurring in the Middle East and North Africa (MENA) region. Civil clashes in MENA societies, as well as an inevitable global focus on the region, have all had consequences in various fields, followed by the outbreak of new conflicts in Syria, Libya, and Iraq that began in 2011 and are still influencing the entire region in a significant way.

The initial aim of the Syrian civil movements (as a part of the Arab Spring) advocated political change and was met with a violent crackdown on democratic rights. The government and its allies exploited various ethnic divisions, which naturally resulted in the formation of different sectarian organizations (Gleick 2014).

In addition to the political background, climate change has had a direct impact as well. Historically, scarce water supplies have been the source of water-based conflicts in the MENA region, to a greater extent than other regions (Gleick 2000), and thus many ethnical and geographical divisions have arisen based on water resources. The extreme dependence of agriculture on traditional irrigation mechanisms makes food security vulnerable in rural

areas. It is not surprising that many villagers have been displaced as a consequence of environmental change. Ex-villagers who have been made migrants because of droughts are considered as key human resources by both pro- and antigovernment organizations. Therefore, the role of environmental crisis should not be overlooked as one of the causes of recent MENA conflicts (Gleick 2014; Lelieveld et al. 2016; Klingmüller et al. 2016).

Obviously, there is a need for interstate conversations and agreements in order to thwart this destructive trend (Powell 2016). Otherwise, much of the extraordinary economic achievements of recent decades in MENA, including its infrastructure, will be imperiled (World Bank 2015a,b). Lasting solutions to environmental changes will vary depending on the features of specific local ecosystems. A model for tackling the effects of climate change should be pragmatic, efficient, flexible, inclusive, and applicable to each area. Permaculture has been proposed as a technique that meets these requirements, and its application to the MENA region is considered in the discussion below (Leahy and Goforth 2014, their Fig. 4).

This paper takes a preliminary look at the role of climate change in MENA violence and the potential for redressing this contributing cause of the region's

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conflicts, drawing on interviews with the limited number of individuals available for such interactions outside the region as well as secondary data where available. The aim is to explore the topic and lay the groundwork for further study when and where possible.

2. Background

According to scientific predictions, MENA is not only more likely than other regions to be affected by rising temperatures, adaptation to climate change in the region will be the more difficult because of its dependence on nonmodernized agriculture and a lack of adequate technologies (Powell 2016).

In addition, the role of population growth should not be underestimated. For example, in Syria (as the representative and core of the current MENA clashes), the population increased from 3 000 000 to 21 000 000 between 1950 and 2010, a time when annual precipitation declined, which has dramatically affected Syria and its surrounding areas, including the water resources of the Tigris and Euphrates Rivers. While social and political violent clashes and droughts have occurred simultaneously since 2006, the population of Syria increased from 19 000 000 in 2006 to above 21 000 000 in 2010, raising the demand for food while food production did not experience any significant change. Droughts and mismanagement created a range of unstable circumstances that resulted in the emergence of conflicts in Syria starting in 2011 (Amos 2010; Gleick 2014; FAO 2015).

It is notable that, so far, no policies have appropriately addressed a solution to the issues of climate change by any of the MENA nations. The current environmental disasters in the MENA region are caused or exacerbated by human activity. The failure of crop production is the outcome of mismanagement in climate change adaptation and natural resource conservation, which has led to the destruction of many rural fields in Syria, affecting large sections of the population (Powell 2016). As one example, the Southeastern Anatolia Project (GAP), which includes construction of dams on the Tigris and Euphrates, has been controversial among countries along those rivers as a consequence of water shortages in both rivers (Amos 2010; Akmansoy 1996). About 70% of the water resources of the Tigris and Euphrates are located in Turkey, and the rest are located in Syria, Iraq, and Iran, with above 80 000 million m³ annual runoff. Turkey plans to store 24% and release 76% of the water, but no efforts have been made to reach any long-term agreements among the countries in the rivers' watersheds (Akmansoy 1996).

Since 2007, the effects of drought have become notable in downstream areas of the Euphrates and Tigris. No

significant agricultural products can be grown in these areas, and many lands have dried and become virtually unusable. However, even those outcomes could not persuade dam managers in Turkey to release more water. The dam managers claim that the solution is the modernization of the irrigation system in downstream Arab areas, not the release of more water from Turkish dams (Amos 2010).

Besides Syria and Iraq, Yemen, Libya, and many more states of the MENA region are experiencing violence, which has eroded hopes for the long-term development of these countries. In Yemen, about half of the population used to cultivate crops, but climate change is having a significant influence on Yemeni farms and has caused the displacement of farmers. At the same time, the rise of chaos within the country has resulted in many individuals joining or being forced to join violent groups. Violent conflicts have thus spread throughout Yemen and have affected its neighbors as well (World Bank 2015a; Zohar 2016).

On the other hand, Libya is one of the most vulnerable North African states in terms of climate change, along with its long-term problems related to soil fertility and precipitation. Moreover, the Arab Spring and related conflicts in Libya have occurred in parallel with increase in the number of drought days, which is still predicted to double from approximately 100 to over 220 days annually over the next 40 years (Femia and Werrell 2012). Libya has the fifth highest potential for wind power among MENA countries, but 99% of its energy is obtained from fossil fuel resources, and no serious effort has been made to develop environmentally friendly alternatives. These factors all have contributed to the rise of tensions within Libya. Only 1% of the country's land is cultivable, making Libya's food security vulnerable as well [London School of Economics and Political Science (LSE) 2015; Femia and Werrell 2012].

Human aggression is another consequence of temperature rise due to climate change and has been taken into account specifically by social psychologists and criminologists. It is claimed that environmental crises have a deep and extreme influence on a human being's mentality, increasing the frequency and intensity of crimes (White 2016). In contrast to the MENA region, the rest of the world has not suffered climate change-based human aggression in a tangible way. It is possible, therefore, that MENA culture itself is highly vulnerable to heat aggression or that conditions in MENA in this regard have changed more dramatically in relation to human limits than they have elsewhere.

The current conflicts of Syria, Iraq, Yemen, and Libya reflect a clash among regional and global competitors in the MENA region, one that may not have a single cause.

In other words, although climate change is a significant contributor, there are a variety of other sources of conflict that must be studied as well. Cultural traits, along with the climate change, create the preconditions for the emergence of conflicts in the MENA region. In addition to national, tribal, and religious cultural traits, historical and anthropological characteristics must also be taken into account.

To avoid the errors of studies that draw separate, simplistic cause-and-effect models about MENA conflict from the vast range of cultural, historical, political, religious, anthropological, and tribal characteristics of the region, it is necessary to find a homogenous framework of analysis to understand both historical-cultural and social psychological-behavioral factors in a single clarifying template.

3. Research methods

The research is based on a literature review and surveys that explore the impact of climate change on the outbreak of violence in the MENA region through the destruction of agriculture and the need for an urgent and sustainable remediation to the crisis.

This paper is an exploration of the topic rather than a definitive study. This limitation is mainly because of lack of access to an adequate number of individuals to interview. There remains a need to conduct another larger study, which requires broader access to more individuals who have similar backgrounds to the individuals surveyed in this study. This group consists of members of formerly successful farmer families or communities in the MENA region who have fled their homes in recent years because of violence and related destructive situations. To conduct surveys in a larger study, researchers would need either to travel to the MENA region for field observation and data collection or work with refugees from the region who are willing to help with the research. If travel to the region were possible, interviews with the farmers who have remained would provide a valuable contrast to those who have fled.

Surveying a larger number of individuals who can be counted as a sample group, reflecting the entire displaced farmers' community of the chaotic zones of MENA, and utilizing statistical analysis will help test and develop theories in socioenvironmental fields, including climate change adaptation and social development. Recognizing the difficulty of conducting such research at present, this paper is instead a preliminary exploration of the topic to create a basis for further research when possible.

a. Primary data: Respondent selection

We surveyed 10 Syrian, Iraqi, and Libyan residents in Australia, who had escaped from the core conflicts in or

TABLE 1. The ethnicity, gender, and home location of the survey respondents.

Respondents' background	Ethnicity	Gender	Home location
R1	Arabic	Male	Aleppo, Syria
R2	Arabic	Male	Damascus, Syria
R3	Arabic	Male	Idlib, Syria
R4	Arabic	Male	Al-Sharqat, Iraq
R5	Arabic	Male	Nasiriya, Iraq
R6	Arabic	Male	Beiji, Iraq
R7	Kurdish	Female	Kirkuk, Iraq
R8	Arabic	Female	Marj, Libya
R9	Kurdish	Female and male (couple)	Hasaka, Syria

prior to 2016, 8 as individuals and 1 husband-wife couple together (Table 1). Studying the conflict in Iraq and especially Syria (as the core and representative of the current MENA clashes) provides us with sufficient information that we can begin to analyze the whole ongoing conflict in the MENA region from various perspectives.

The individuals who were surveyed were chosen on the basis of their geographic and ethnic backgrounds in order to make sure that the survey cohort represents a wide range of people from the MENA region, both Arabs and Kurds, as well Iraq, Syria, and Libya. All have fled from their homes because of violence and its aftermath.

b. Primary data: Survey questions

Interviews were conducted with the respondents using open-ended questions. This method provides flexibility and allows respondents to tell their whole story. The open-ended questions were designed to stimulate a friendly and comfortable conversation, some of them through interpreters to facilitate communication. The whole interview process for each correspondent lasted roughly 45 min.

c. Secondary data

After searching for data, a variety of secondary resources were utilized. However, unlike many other popular case studies, there are no principal references to consider for this topic because it is an emerging case and little has yet been written (another motivation for writing this preliminary study). Instead, a range of peer-reviewed articles were utilized that had approached one aspect or another of this topic. Beside these articles, World Bank and FAO statistics were considered in addition to other sources that provided relevant information or insights.

TABLE 2. Farming experience of the survey respondents.

Q1: Have you or any close relative/s to you been farming in a rural area to feed your family for the past 20 years?		
Answers	Brief response	Extended response
R1	Yes	A farmer family, had 10 ha land
R2	Yes	Had two piece of land, one inherited and one bought about 8 ha totally farms and gardens
R3	Yes	Used to be in a big farmer family feeding on 15 ha land
R4	Yes	Brother of R4 had agriculture as job 9 ha owned land
R5	Yes	Had hired farmers to work on their about 10 ha of land
R6	Yes	A shared farm of 2.5 ha
R7	Yes	Her husband family own about 5 ha farm land and manage hired work force on land
R8	Yes	Her father and uncles have about 3 ha inherited land from her grandfather
R9	Yes	All family were doing cultivation on 30 ha owned land Based on well water

4. Results

a. Primary data results

Responses to the survey questions are summarized in Tables 2–6.

Yes is the response of all respondents to question 1, about involvement in farming, as all their families used to cultivate professionally. Respondents 2, 4, 6, 7, and 8 used to own farm of under 10 ha, while respondents 1, 3, 5, 8, and 9 owned farms of 10 ha or more. Responding to the second question, about losing farming livelihoods, respondents 1, 4, 7, and 9 said yes but respondents 2, 3, 5, 6, and 8 said no. Every single correspondent mentioned that enormous damages have affected their farms because of government mismanagements and/or because of droughts.

Noticeably, there is no consensus among the responses of correspondents to question 3 about the connection between violence and poverty: respondents 1, 2, and 3 said yes, but respondents 4, 6, 7, and 8 said in part and respondents 5 and 9 said no. However, none of the correspondents ignored the impact of poverty and lack of

food. Only R8 said no when responding to question 4, about poverty as a factor in joining violent organizations. While respondents 1, 6, and 9 emphasized hunger-based issues as the foundation for violent groups, the rest of the respondents highlighted a variety of influences such as unemployment, drug addiction, and discrimination. In reply to question 5, comparing past and present conditions, all the correspondents except R7 believed their rural life was much better in the past in comparison to the present. It is important to note that the majority of respondents had experienced less racism within their rural areas in the past compared with the present. A more cohesive coexistence and greater trust between villagers along with higher tolerance and more food were characteristic of the past.

b. Secondary data results

As noted at the end of section 2, a single clarifying template is needed to understand the combined causes and expressions of violence in the MENA region. One such template for analyzing violence in MENA comes

TABLE 3. Droughts effect on farms of survey respondents.

Q2: Has this person or any other farmer you know lost his farming due to droughts?		
Answers	Brief response	Extended response
R1	Yes	Since 2007 water limited but high migration arrivals that caused rise of crimes.
R2	In part	In our districts main reason was plant disease and season weather instability.
R3	In part	River subbranches dried more frequent and irrigation costly.
R4	Yes	Government does not support agriculture. Massive imports of agricultural products. Tigris water not adequate since 2007.
R5	In part	Shortage of water, drier weather, and civil clashes since 2007; consequently some left farming and migrated or joined construction works.
R6	In part	Decrease of water and bad weather for 10 years.
R7	Yes	Most of the small marshes dried out and water for irrigation unstable.
R8	No	They used well to irrigate by underground water in dry summers.
R9	Yes	Many people lost their farming. No food and crowd started migrations (prior to war). The agriculture was damaged (during war) Government confiscated many lands.

TABLE 4. Attitude of the survey respondents about the effect of poverty on violence.

Q3: Do you believe that an important cause to recent violence in your area is because of poverty and lack of food?		
Answers	Brief response	Extended response
R1	Yes	Not enough food and lack of government support.
R2	Yes	Farmers could not afford costs, consequently land use changed many and crimes increased.
R3	Yes	Organized discrimination and also change of lifestyle, which affected life expectations, are the main causes.
R4	In part	Unemployment and need for money cause people to join violent groups.
R5	No	Extremism and corruption are the causes of violence.
R6	In part	Poverty has extremely affected people who were not accepted to government jobs.
R7	In part	Some people join violent groups for money but most of them advertise and hire from fanatic youth.
R8	In part	Using drugs is more important cause than poverty.
R9	No	War was more political; however, poor people more likely to join violent groups.

from the theories of Ibn Khaldūn, a Tunisian sociologist who recorded his professional observations about the cultural and social traits of the MENA region in the fourteenth century (Khaldūn 1958). According to the most famous theory of Ibn Khaldūn, *asabiyah*, many personal and gang behaviors are affected by the ideology or values of the group that people belong to. *Asabiyah* (or group feeling) is more about an emotion or state of spiritual affinity to the group one feels related to rather than an intellectual commitment. These groups vary from ethnical and tribal communities to cultural and ideological groups. *Asabiyah* mainly explains bias and even fanatical support for one’s community. Accordingly, different communities in MENA define, utilize, or avoid *asabiyah* under differing circumstances in favor of their own interests to boost their authority while confronting competitors. As a consequence, although the *asabiyah* concept is widely understood in the region, there is no intertribal entente in MENA to discuss *asabiyah* in order to distinguish between destructive and constructive types of *asabiyah*, and it remains the most significant human factor in the violent behavioral actions and reactions within the MENA region.

Based on this study’s secondary resources (and also survey findings confirm), it is clear that climate change has had a destructive influence on MENA agriculture, which has caused chaos in rural life and the displacement of a huge population (Fig. 1). Migrants leave their home communities and even their countries seeking better economic prospects, away from the degradation of agricultural production, fears of hunger, heat rise-based aggressions (White 2016), and the distortion of the *asabiyah* mentality toward violence: the four drastic factors that have combined to produce this unique stage of history in the MENA region. Note that climate change is implicated directly in at least three of these causal factors and exacerbates the impact of the fourth.

As a consequence, racism might have been increased throughout the region. Competition over water resources has damaged the lives of many villagers across the area and has led to the rise of multisided domestic and regional conflicts. Moreover, there could be a hypothesis that in the MENA region, the destructive sense of *asabiyah* has erupted more frequently among uneducated villagers than in urban communities, highlighting social, ethnic, and religious divides, which in

TABLE 5. Attitude of the survey respondents about the ex-social class of violence contributors.

Q4: Do you think many people who join violent organizations are poor people or some people who have been farming in the past but are currently unemployed?		
Answers	Brief response	Extended response
R1	Yes	Ex-farmers joined violent groups due to droughts and discriminations.
R2	In part	Some only follow their ideology but the rest commit to violent organizations due to need for money.
R3	Yes	Economic problems and lack of listening to elders has placed many youth in these groups.
R4	Yes	We faced discrimination and unemployed and inevitably chose farming as independent job, but droughts emerged.
R5	Yes	Most of them from ex-farmer families with no education.
R6	Yes	Even heard some of their close relatives were involved in such groups but that is due to facing discrimination and poverty.
R7	Yes	It has been about 10 years that these groups are much more interesting to poor people especially less educated ones and also there is no plan to control the crisis.
R8	No	Another reason must be behind this scenario.
R9	Yes	People join violent groups to obtain money to eat.

TABLE 6. Comparison between the present and past by the survey respondents in terms of rural life quality.

Q5: How do you describe the social life of rural communities if you make an analogy between the past and present?		
Answers	Brief response	Extended response
R1	It was better in past	There was more friendship and trust. People used to share their products. Less racism in past.
R2	About the same	Many people and customs are the same; however, opportunism has increased.
R3	It was better in past	Villages were small with more satisfied people but now people are in rush and fear with fewer relations.
R4	It was better in past	Village was a protein factory but now import foods. There was less racism but now radicals affect people. We used to cultivate but now most of my relatives have no job. But women's education improved.
R5	It was better in past	People lived in peace when I was a child. But now only violence and crimes.
R6	It was better in past	Had lived a very better life and incomparable to present, now almost 80% of villages have been vacant.
R7	It was better in past	Facilities, infrastructure, and education are much better than before.
R8	It was better in past	Some people in some areas still have the same social life.
R9	It was better in past	There was less racism, 25% of products belonged to the landowner, and 75% to farmers. Eids (annual celebrations) were livelier and zakat (alms) were given more frequently.

turn fuel the ongoing battles. In Syria, where the most violent clashes since 2011 have taken place in the ex-agricultural areas, it is clear that many displaced rural communities have inevitably provided human resources for both pro- and antigovernment violent forces. The displaced villagers have joined the violence consciously, to earn money, and unconsciously, as their *asabiyah* encounters other communities' *asabiyah* in an expanded battlefield.

5. Discussion

According to the Paris Agreement on climate change (United Nations 2015), countries around the globe are expected to support a range of climate change adaptation efforts in undeveloped countries. Furthermore, a series of legal reforms are required, including recognition of climate-based crimes (Dyer 2011; Bain et al. 2016; White 2016). However, MENA, as a region deeply

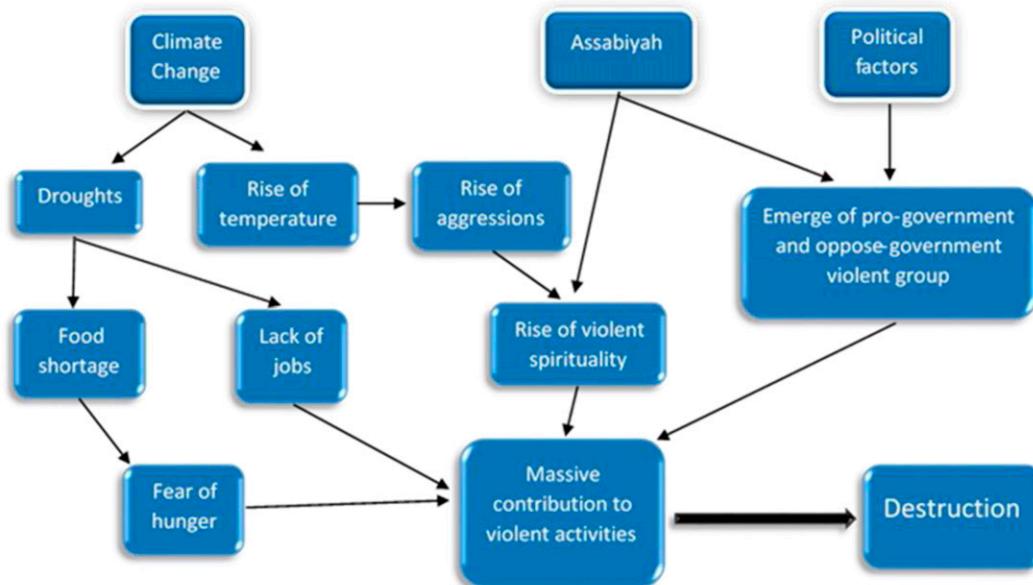


FIG. 1. The contributions of climate change to the outbreak of early twenty-first-century violence in the MENA region.

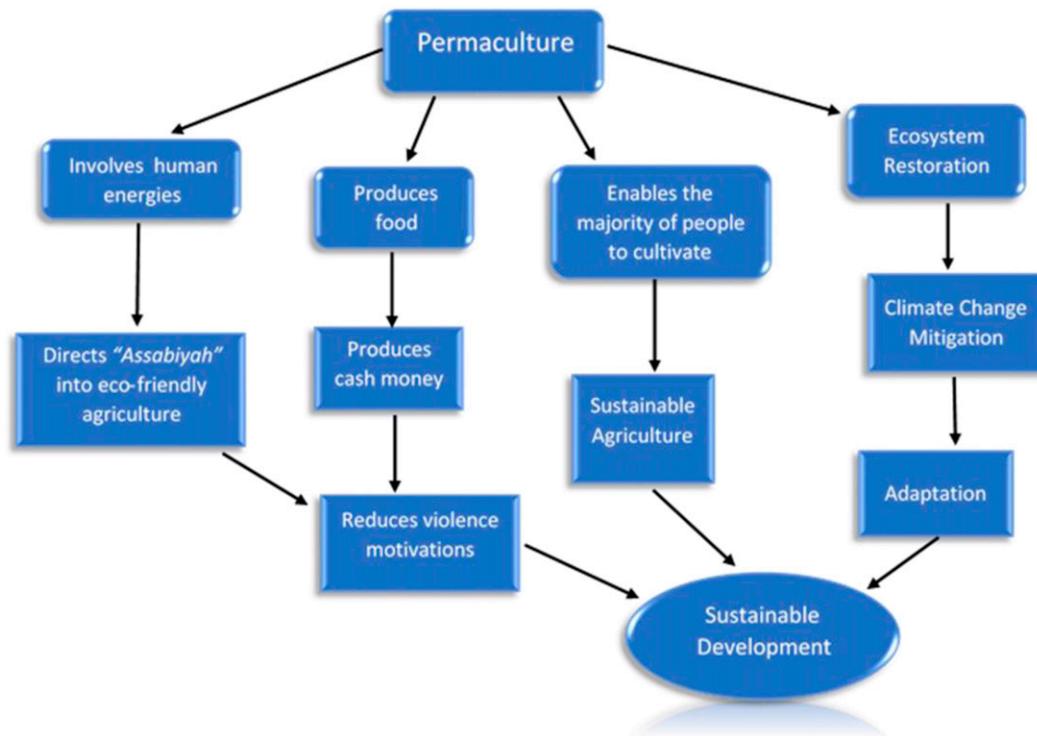


FIG. 2. The potential contribution of permaculture to stability in the MENA region.

affected by climate change, needs to be considered for emergency remediation (World Bank 2015a,b).

Obviously, it is not realistic to claim the existence of a single solution for redressing the damages in the MENA region, but overcoming the effects of climate change specifically, as one key cause of the present conflicts in MENA, can be attempted through a range of targeted local and global initiatives. Those initiatives must take into account the climatic as well as the cultural conditions of the region, such as *asabiyah* and the links between farming failures and violence that are apparent from the interviews.

The promotion of sustainable agriculture might be considered a fundamental principle when designing climate change adaptation models (FAO 2017), notably among arid and semiarid areas such as MENA’s ecosystem. However, concerns about food have spread within the MENA states, particularly among the Gulf countries, which have been driven to sign agricultural contracts in order to own farms in other countries in order to secure their society’s food (Schwartzstein 2016). Nevertheless, such outsourcing of agricultural projects is not recognized as sustainable development in either of the food-exporting or the food-importing countries (Dyer 2011).

Permaculture may offer a viable alternative (Fig. 2). The term essentially refers to coexistence of humanity with nature, combining the words permanent, agriculture,

and culture. The technique was initially developed by Bill Mollison, a distinguished Australian ecologist who sought a sustainable and flexible agricultural model that preserves humanity and nature together while producing more nutritious foods (Leahy 2009; Leahy and Goforth 2014). Permaculture projects have been so far successfully implemented in various areas around the globe, not only boosting local and regional food security levels, but also providing a base for displaced individuals in farming activities and dramatically improving the efficiency and productivity of the whole agriculture section (Leahy 2009).

Reversing ecosystem damage through revegetation and the use of natural composts and recycling, which are the other key features of permaculture, would greatly help restore the agricultural lands of the MENA region by combatting desertification and can harness the positive aspects of *asabiyah* by building on connections within the communities involved. Other basic advantages to permaculture include (Leahy and Goforth 2014) the following:

- households may earn money from surplus production;
- families have long-term food security;
- everyone who can use a piece of land can take part; and
- low-input agriculture and no big budgets are needed, as the main support is training only.

6. Conclusions

Climate change has a highly destructive impact on the MENA region compared with other regions and is a major contributing cause to the region's ongoing conflicts, stoking personal, social, and international conflict and aggression. It is clear that climate change adaptation plans are required as at least part of the solution to the MENA crisis. Sustainable agriculture can help address food security and sustainable development, two vital components of successful adaptation that cross climatic, environmental, social, and political arenas. Therefore, plans for MENA should consider this field as well. The permaculture technique offers both short- and long-term solutions to the MENA crisis through supporting local communities both by decreasing poverty and by improving ecosystem health and food security. To be effective, however, permaculture will have to be part of a much broader effort across many aspects of MENA society to stem the crisis of violence in the short term and create sustainable practices in the long term, including adaptation to ongoing climate change and recognition of the implications of *asabiyah*. As noted in the introduction and methods, this is a preliminary study, and these conclusions must be regarded as tentative. At the same time, the MENA region is in crisis and is likely to remain so while causes such as climate change continue to lead to violence. More study is desirable to the extent possible, but action such as introducing permaculture is also necessary and can provide further insight and information from experience.

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