frontiers | Frontiers in Water

TYPE Review
PUBLISHED 23 August 2022
DOI 10.3389/frwa.2022.964688

OPEN ACCESS

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SPECIALTY SECTION
This article was submitted to Water Resource Management, a section of the journal Frontiers in Water

RECEIVED 08 June 2022
ACCEPTED 25 July 2022
PUBLISHED 23 August 2022

CITATION
Aligholi F and Hayati D (2022) Agricultural water security from the perspective of critical theory paradigm. *Front. Water* 4:964688. doi: 10.3389/frwa.2022.964688

Agricultural water security from the perspective of critical theory paradigm

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Ensuring the security of freshwater resources is one of the most important drivers of the quality of social and environmental systems. In recent years, the security of water resources has faced various challenges. In other words, the water resources have become more vulnerable to threats and there is more concern about the sustainable development of socio-environmental systems. The significance of water security and associated concerns have led many researchers to conceptualize the water security and design indices to measure it. The worrying situation of the water security suggests that traditional philosophical paradigms, because of the way they look at man and nature, cannot be successful in solving the problems of agricultural water insecurity. In this regard, it is necessary to look for a new paradigmatic perspective to solve this crisis. In this paper, which was written using a review and analytical study, an attempt was made to examine and compare the concept of water security from the perspectives of positivism, constructivism, and critical theory. In addition, indicators of the critical theory paradigm were introduced and their ability to help conceptualize agricultural water security was explored from a critical theory perspective. The indicators of the critical theory paradigm include: inclusion, communication, cosmopolitanism and change. Also, the concept of agricultural water security from the perspective of critical theory is the emancipation of vulnerable farmers from various communicational, political, social, sexual, economic, and natural barriers. In this process, they will be able to freely participate in water decision-makings and be able to change the existing conditions to the desired conditions. Overall, the results showed that the critical theory paradigm, because of its point of view to the man and nature, as well as its goals of emancipation and change, could be a solution to the complex problems of agricultural water security.

KEYWORDS

water security, agriculture, paradigm, critical theory, conservation philosophy

Introduction

Achieving water security is a very worrying issue in the world today and is one of the biggest pervasive challenges of the 21st century (Gain et al., 2016; Valizadeh et al., 2020; Scott et al., 2021). Some researchers believe that water scarcity may lead to political conflicts or even water wars around the world (Gleick, 2011; Harrington, 2013). Only 2.5% of the world's total water resources are fresh water that can be used by

human-beings. At the same time, global water consumption is growing by 1% annually (Castro-Pardo et al., 2022). Water security is a multifaceted issue (Wagener et al., 2010) and supports public health, economic growth, environmental sustainability, political stability, and disaster risk reduction. In other words, water security is one of the main drivers of the quality of social and environmental systems (Gain et al., 2016; Valizadeh et al., 2022). In fact, it can be argued that water security underlies all aspects of human health and wellbeing and is a very essential element for food and energy production (Frone and Frone, 2015). It is therefore an important and widespread social, economic, environmental, and political issue (Sustainable Water Partnership (SWP), 2016).

Due to the facts that the agricultural sector is the largest consumer of water in the world, it is clear that water security is of particular significance in this sector (FAO, 2017; Fitton et al., 2019). According to forecasts, the share of the agricultural sector in the total water extracted from the world's freshwater resources in 2035 will be 70%, which will be more than 90% in less developed countries (Eidi et al., 2020). In addition, agricultural water security includes food security, environmental security, agricultural economic security, and rural community security (Malekian et al., 2017; Valizadeh et al., 2021). As a result, the inability of countries to ensure water security has irreversible impacts on the raw material production, rural employment opportunities, rural development, and etc. (Taylor, 2015).

The importance of water security and associated concerns have led many researchers to conceptualize water security and develop indicators to measure it. The concept of water security is a dynamic and multidimensional concept (McNeill et al., 2017). This concept emerged in the 1990s and has evolved significantly since then (Cook and Bakker, 2012). Webb and Iskandarani (1998) defined water security as the access of all people to the safe and enough water at all times for a healthy and productive life. According to The Global Water Partnership (GWP) (GWP, 2000), water security means that "... everyone has access to adequate and affordable water to live a healthy life, while protecting the environment". Grey and Sadoff (2007) also mentioned that water security is often defined as the reliable and continued availability of acceptable quantity and quality of water for health, livelihood, and production. Bakker et al. (2013) also believe that water security means "sustainable access to sufficient amounts of water with acceptable quality to ensure the health of humans and ecosystems in the watershed." Water security is generally defined as a situation in which a sufficient amount of water that meets quality standards is available at an affordable price to be used for realization of the short-term and long-term livelihoods, human welfare, socio-economic development, and ecosystem services (Yomo et al., 2019). Scott et al. (2021) also state that water security is a dynamic interaction between social and environmental systems, in response to water and human climatic factors.

Despite the increasing number of research activities on water security, there is still no common definition of it (Cook and Bakker, 2012); while reaching a clear and common definition in this area is very important. Since definitions are choices that include those aspects of the phenomena that are considered important and therefore play a key role in deciding on problems and solutions to water security issues.

A review of studies on conceptualization and measurement of water security shows that most of the researchers rely on a positivist-based paradigm. This paradigm and/or school of thought derives its assumptions and criteria from the natural sciences (Floyd, 2013). Positivists use measurable and quantifiable parameters to measure water security, and their goal is to develop policies that only help improve water quality and quantity (Malekian et al., 2017). Therefore, they pay little attention to human dimensions such as social and institutional capacities (Bakker and Morinville, 2013). In fact, traditional security paradigms, which have always focused on horizontal, existential, and government perspectives, are not essentially equipped with the suitable tools to address the countless water insecurity problems of the 21st century (Harrington, 2013).

However, water is a major component in all aspects of the life. This factor makes the concept of water include a combination and variety of social and political meanings that are important to our understanding about the security (Harrington, 2013). In fact, a person's relationship with water, as a unique and fundamental resource, is characterized by a wide and variable intersection of personal and social needs and identities. It has been frequently emphasized that water security is framed and conceptualized in social context (Dilshad et al., 2019). Therefore, given the complex and rapidly evolving social conditions, water security is more than just dealing with water scarcity. It should also be emphasized that this requires strengthening the relationship between service providers and stakeholders and helping to create new social contracts that demand greater transparency and accountability (Harrington, 2013).

Since the critical theory paradigm deals with how security practices affect social relations and political order (Nunes, 2012), water security is much more than just adequate access to quality water resources. It should be noted, however, that this requires a political understanding of water security that removes barriers to access to systems and communications and prevents others from exercising their rights (Harrington, 2014). However, no research has yet been done on water security indicators and the conceptualization of the water security based on the critical theory paradigm. Therefore, the main purpose of this study was to determine the indicators of agricultural water security based on the critical theory and its conceptualization. In this process, the paradigms of positivism and constructivism in relation to water security were examined and compared with the paradigm of critical theory.

Research method

This research is qualitative in terms of paradigm. In terms of purpose, it is of analytical type of studies. In terms of method, it is a review study and in terms of perspective, it is an extensive research. Accordingly, at first, we reviewed those studies toward the three main paradigms of positivism, constructivism, and critical theory, and compared them in terms of ontology, epistemology, and methodology based on an analytical perspective. Then, focusing on the critical theory paradigm, we examined the necessity of measuring water security based on critical theory. At the end by examining different sources, we obtained the main indicators of water security and also a new concept of water security based on critical theory.

Paradigm

The issue of paradigms has always been a hot topic of discussion for scientists, philosophers, and experts in various fields; so many researchers believe that no one should do research unless they are aware of exactly the paradigm that guides them (Guba and Lincoln, 1994). The paradigm is a fundamental belief system and in fact a way to understand and study the reality of the world (Rehman and Alharthi, 2016). A paradigm can be thought of as a subjective representation of how an institution is constructed (its parts and their interrelationships) and how it functions (its behavior in a particular context or time zone) (Huitt, 2019). Paradigms are based on ontological, epistemological, and methodological assumptions (Greene and Caracelli, 1997).

There are different classifications for paradigms, but according to Guba (1990), the three paradigms of positivism, constructivism, and critical theory have fundamental differences in ontological, epistemological, and methodological aspects, which is why these three paradigms are examined.

The paradigm of positivism

Positivists believe that strict adherence to methodological rules leads to objective truth (Äge, 2010) and that truth is external, discoverable, and observable (Brennan et al., 2011). In fact, positivism advocates identifying problems, proposing theoretical hypotheses, and then using methods such as testing or researching hypotheses (Xinping, 2002). Thus, the relationship between the positivism paradigm and quantitative research methods is very strong and clear (Makombe, 2017).

The ontology of the positivism paradigm follows the position of realism. Reality in this paradigm has an existence independent of the researcher (Cohen et al., 2007). Therefore, there is a fact that can be discovered independently of the researcher (Pring, 2000). The epistemology of positivists is based on objectivism. Meaning is only in objects, not in the researcher's conscience, and the researcher's goal is to acquire this meaning (Crotty, 1998). The positivists' methodology is the explanation of relationships. Positivists try to identify the causes that affect the results (Creswell, 2009). This paradigm seeks to predict and generalize. Thus, methods often produce quantitative data and use standardized tests, close-ended questionnaires, and phenomenon descriptions using standard observation tools (Pring, 2000). The analysis also includes descriptive and inferential statistics. Inferential statistics allow sample results to be generalized to larger populations (Scotland, 2012).

The paradigm of constructivism

Constructivism is a reaction to the over-domination of the positivism (Grix, 2004). Constructivism rejects the idea that there is a single and provable reality independent of our senses. Instead, constructivists believe in multiple social structural realities (Rehman and Alharthi, 2016). In their perspectives, truths exist through our senses, and without consciousness, the world is meaningless and non-sense. Reality emerges when consciousness engages with the objects that already carry meaning (Crotty, 1998). Constructivists acknowledge that knowledge is not value free, and researchers express their opinions when they choose what to research, how to research, and how to interpret their data (Edge and Richards, 1998).

The ontological position of constructivism is relativism (Guba and Lincoln, 1994). Relativism means that reality is a subjective thing and can be different and even contradictory from person to person (Upadhyay, 2012). Constructivism epistemology is based on subjectivism based on real-world phenomena. According to the paradigm of constructivism, there is no world independent of our cognition (Grix, 2004). Constructivism methodology deals with understanding the phenomenon from an individual perspective, examining the interaction between individuals, as well as the historical and cultural context in which people live (Creswell, 2009). Examples of methodologies in this paradigm include case studies (in-depth study of events or processes over a long period of time), phenomenology (study of direct experience without the intervention of existing presuppositions), hermeneutics (derivation of hidden meaning from language), and ethnography (study of cultural groups over a long period of time) (Scotland, 2012).

The critical theory paradigm

Critical theory is a term coined by theorists based at the Frankfurt Social Research Association in the 1920s and 1930s (Fuchs, 2017). Critical theory is developed through the dialectic

TABLE 1 Comparison of the positivism, constructivism and critical theory paradigms.

Paradigm	Ontology	Epistemology	Methodology	Main purpose	Advocators
The paradigm of positivism	- Realism - Reality is independent of the researcher - Believing in a single reality, provable and independent of the senses	- Objectivism - Meaning is only in things, not in the researcher's conscience - Data is worthless	- Seeking to explain the relationship - Quantitative methods - Laboratory	- Identifying problems - Presenting hypotheses and examining hypotheses	- Auguste Comte - John Stuart Mill - Moritz Schlick - Rudolf Carnap - Otto Neurath
The paradigm of constructivism	- Relativism - Reality is a mental thing and can be different and even contradictory from person to person. - Believing in multiple structural-social realities is due to our senses, and without consciousness, the world is meaningless.	- Subjectivism - There is no world independent of our knowledge of it. - Meaning is not discovered, but is created through the interaction between consciousness and the world.	- Seeking to understand the phenomenon from an individual's perspective, examining the interaction between individuals and the historical and cultural context in which people live. - case study - Phenomenology - Ethnography	- An attempt is made to understand the people's interpretations of the social phenomena with which they interact. - Understanding or interpreting social life and discovering social meaning	- Friedrich Schleiermacher - Boke - Wilhelm Dilthey
The critical theory paradigm	- Historical realism - Reality is changeable and is formed over time by social, political, cultural, economic, ethnic, and gender factors and these factors interact with each other to create a social system.	- Interactionism and subjectivism - Knowledge is made both socially and under the influence of power relations from within society. - Findings are valuable	- Follows a dialogical and dialectical methodology. - Critical discourse analysis - Critical ethnography - Action research - Ideological criticism	- Explaining or understanding society is not only the goal, but also its change and human liberation. - Transformation in situations and beliefs and revealing restrictive human actions	- Herbert Marcuse - Theodor Ludwig Wiesengrund Adorno - Max Horkheimer - Jürgen Habermas

Source: Research findings.

of theory, which aims at incomprehensible critical changes in society. Theoretical discussions, debates, and encounters are part of the dialectic of theory. The most well-known representatives of this paradigm include Herbert Marcuse, Theodor W. Adorno, Max Horkheimer, and Jürgen Habermas (Fuchs, 2022).

The ontological position of critical theory is historical realism (Guba and Lincoln, 1994). According to historical realism, reality is changeable and is formed over time by social, political, cultural, economic, ethnic, and gender factors and interact with each other to create a social system (Kincheloe and McLaren, 2005). Realities are constructed social entities that are constantly influenced by internal and external factors (Scotland, 2012). Language does not passively label objects, but actively shapes reality (Frowe, 2001). Reality is constructed through the interaction between language and aspects of an independent world. Critical theory, however, accepts the perspective that language has power relations, so it is used to reinforce or undermine the reality (Scotland, 2012).

Epistemology of the critical theory is interactive and subjective. In other words, such epistemology is based on real-world phenomena and links to social ideology. Proponents of this theory believe that knowledge is constructed both socially and under the influence of power relations from within society. Thus, the findings are valuable (Guba and Lincoln, 1994). Critical theory begs the question: what is inherently valuable? Thus, critical theory is based on norms. In other words, this theory considers what the situation should be like. The imaginative ideals of the critical theory-based paradigm may never be realized, but a more democratic society may be realized (Scotland, 2012).

Table 1 shows the comparison of the paradigms of positivism, constructivism and critical theory in terms of ontology, epistemology, methodology, main purpose and advocators.

The perspectives of positivism and constructivism paradigms on agricultural water security

From a positivism point of view, agricultural water security is explained in terms of facts obtained by removing the contextual factors (Lautze and Manthrithilake, 2012). The main purpose of this research based on the positivism

paradigm included measuring agricultural water security at the international and national levels, testing water security hypotheses and factors affecting it (with the aim of predicting water security), identifying real water security threats and controlling these threats (Malekian et al., 2017). For example, in order to evaluate the water security in Iran and its large watersheds over a period of 20 years at intervals of 5 years, Zakeri et al. (2022) introduced eight indices affecting water security. These indices included per capita renewable water resources, water intensity, water efficiency, investment in water infrastructures, water quality, access to freshwater and pollution management, changes in green cover levels and large-scale changes to minimize the water security. Using the Analytical Network Process (ANP) method, the researchers employed the presented indices to calculate the average values for water security in watersheds of Iran. The results revealed that although the amount of water security has changed in different time periods, but water security has decreased between 1996 and 2016 across those six watersheds which were studied.

From the perspective of the paradigm of constructivism, agricultural water security is considered as an inter-subjective concept that is constructed by the process of interaction and negotiation (Liu et al., 2007). The objectives of the research based on the constructivism paradigm include understanding agricultural water security based on the perceptions of the stakeholders involved and interpreting the social interactions and variables that shape these perceptions. In addition, understanding how security perceptions and practices affect social relations, and in particular farmers' beliefs, attitudes, and behaviors about water, is another goal of research based on the constructivism paradigm (Malekian et al., 2017).

For example, Malekian (2017) in her research, which was conducted using the paradigm of constructivism, tried to identify and analyze the variables that shape perceptions in the field of agricultural water security using the phenomenology method. In that study, "water availability," "water accessibility," "water quality," "water sustainability," "economic aspects," "socio-political aspects," and "water-related risks" were identified as the main components constructing the agricultural water security. She also designed an index to measure the perception of agricultural water security and used a questionnaire to measure this index among farmers. The results revealed that the perception of water security is below the average. Furthermore, perception of agricultural water security is not achieved only by the objective characteristics of resources and a set of factors affect it, as well.

The perspectives of critical theory paradigm toward agricultural water security

In the field of agricultural water security from the perspective of critical theory paradigm, limited studies have been conducted; so that a comprehensive and complete concept has not yet been presented that includes all the items that are considered important and necessary from the point of view of the critical theory. Besides, no studies have yet been conducted on the indices that measure the perception of agricultural water security based on critical theory paradigm. Malekian (2017), for instance, used Harrington's definition of water security (Harrington, 2013) to redefine the concept using the critical theory paradigm. In her study, she described the concept of agricultural water security from a critical paradigm perspective as follows: "the process of securing vulnerable farmers from natural, social, and political barriers to be able to provide the water resources needed for a good life. But in the process, not only must water security be ensured, but others must not be deprived of it and damaged ecosystems must not be destroyed."

In the following, while expressing a comprehensive concept of agricultural water security, we examine the indices for measuring agricultural water security based on the critical theory paradigm.

Why should the discussion on agricultural water security be based on the critical theory paradigm?

Both the positivism and constructivism paradigms are crucial to research. Since they seem to be embedded "in the dominant ideology" (Scott and Usher, 2010). The World Water Development Report (WWDR) considered water as a vital natural resource on which all social, economic, and ecosystem activities depend. Therefore, the issue of water security, which is traditionally understood, is not able to completely respond to a wide range of uses, meanings, and functions of water (WWAP, 2012).

One of the most significant reasons for the failure of these paradigms in solving important issues such as agricultural water security is the philosophical view of these paradigms and their view of man and nature; for example, positivists turn a blind eye to the actors and treat active human beings such as the facts and objects. In other words, they consider human beings as the scheme of "mechanical determinism" (Ebrahimi Minegh et al., 2008). In addition, positivists affirm and validate the existing social order by simply paying attention to what exists. As a result, they hinder any fundamental change and ultimately contribute to the political indifference. To these critiques must be added the fact that positivists do not pay attention to the historical roots of a phenomenon and only deal with a narrow section of a context and its analysis (Riters, 2001).

Positivists have a "human-centered" view of man and nature, and this factor makes "exploitation of nature" sacred in this paradigm (Beck, 1999). In fact, nature is considered as a resource that can and should be available to humans without restriction (Beck et al., 2003). In other words, this human-centeredness has made nature regarded as an impartial and infinite provider.

Positivists believe that nature can be controlled by human science (Beck et al., 2003). As a result, many aspects of nature have been influenced by purely scientific interests aimed at maximizing profits (Giddens, 1998).

This paradigm is based on the belief that the human beings can make themselves the standard and master of everything; while nature is only considered as a "substance" that is controlled and used for human purposes. According to the positivism paradigm, nature is primarily considered as a means of production, a commodity for consumption, and a precondition for human health (Van Koppen, 2000). In fact, positivists in the face of nature try to introduce some tools that provide the conquest of nature to improve human wellbeing. It should be mentioned that in this process, the nature will be separated from society (Yazdanpanah et al., 2013).

Therefore, nature, especially water, is no longer a source of independent and intrinsic value and becomes a mere resource that is repelled by human desire. In this paradigm, water is considered as a commodity that can be bought, sold, and used to make other goods. Thus, without intrinsic value, it can be manipulated in any way (Worster, 1986). In this paradigm, water security is essentially an engineering problem; that is, an efficient solution to deal with the problems lies in the technological development (Brunner and Steelman, 2005; Nelson et al., 2008). The constructivism paradigm has also been criticized by experts for its passivity and disregard for the change, justification of the status quo, and disregard for the human role in changing the status quo to achieve the desired status quo. Therefore, it seems incapable of solving complex problems (Kincheloe, 2008).

The critical theory paradigm, on the other hand, considers and examines a wide range of relationships, individuals, and societies (Harrington, 2014). This paradigm deals with how security perceptions and practices affect social relations and political order (Nunes, 2012). Adherents of this theory, believing in the dialectical view, also state that without a general perspective, human beings will not be able to understand the social phenomena. In other words, the society is a "social whole" in which there is conflict (Ebrahimi Minegh et al., 2008). Based on the dialectical approach, attention should be paid to the mutual relationships of different levels of social reality. Therefore, for every phenomenon, it is necessary to identify two elements, "synchronic" and "non-esynchronic" (Riters, 2001). The "synchronic" element leads us to pay attention to the interrelationships of the components of society. The "non-esynchronic" element leads us to the historical roots of today's society (Robert, 1996).

Moreover, according to the proponents of this paradigm, theory not only plays a descriptive role in the current situation, but also changes the situation to the extent that they claim that the purpose of critical theory is not simply to explain or understand society, but to change and emancipate it (Patton, 2002; Fazliogullari, 2012).

The paradigm of the critical theory also takes a new look at man and nature and offers a new concept of the nature. Nature is no longer perceived merely as an alien that can adapt to the human goals, but as a part of the society (Beck et al., 2003). According to the critical theory paradigm, nature has a complex system of production methods, social values, and ecological relationships (Thompson, 1997). According to this theory, water can no longer be separated from social systems and issues of equality. Water security must therefore be understood in terms of the interrelationships between the social, cultural, religious, and technical aspects of the production system (Divan and Rosencranz, 2005).

Another important reason why we believe that agricultural water security should be analyzed based on the paradigm of critical theory is that water is one of the most important common resources. In this regard, in 1968, Garrett Hardin introduced The Tragedy of the Commons. According to him, The Tragedy of the Commons occurs when the desire to gain personal/private-sphere benefit in a shared resource disrupts or destroys the collective interest (Hardin, 1968). In fact, those in power, regardless of the consequences for the deprived and vulnerable group, act independently in their personal interests.

Water is one of the common resources that is not distributed fairly, and this debate becomes more important in agriculture when those in power trample on the rights of vulnerable farmers in the distribution of agricultural water for personal gain and greater profit. This makes the powerful stakeholders richer and the vulnerable farmers poorer over time. Such a perspective also causes this vital and important resource to be destroyed and its sustainability to be impaired. However, the main goal of the critical theory paradigm is emancipation (Bronner, 2001) and the main feature of emancipation is based on the rights and needs of the most vulnerable groups (McDonald, 2011). In fact, critical theory paradigm seeks an inherent possibility that can serve the interests of marginalized and neglected actors (Linklater, 1990). Therefore, considering the tragedy of agricultural water resources and the emancipation aim of the critical theory paradigm, it is worthwhile to address the issue of agricultural water insecurity from the perspective of the critical theory paradigm.

Therefore, according to the philosophical perspectives of positivism and constructivism paradigms, it seems that the solutions provided by them are not suitable for solving multidimensional and complex problems of agricultural water security. Thus, the water security issues should be addressed and solved based on the paradigm of critical theory. Given the above-mentioned arguments, the critical theory considers water security to be much more than just adequate access to quality water resources. It covers a wide range of relationships between individuals and communities, taking into account historical roots. In addition, while explaining or understanding the current state of society on issues related to water security, seeks to change that situation. With respect to the tragedy of agricultural

water resources, this paradigm prioritizes the emancipation of vulnerable farmers.

Indicators of the critical theory paradigm

Emancipation

Emancipation is a complex concept—a concept that, despite being a crucial component of security, has received relatively little attention (Harrington, 2014). Emancipation is the main goal of researchers who follow the critical theory of the Frankfurt School of thought. Indeed, while critical theory encompasses a wide variety of approaches, the link between them all is the "emancipation" (Bronner, 2001). Frankfurt school thinkers believe that liberation is the highest human value (Habermas, 2004). According to Rancière (1995), the concept of emancipation means the recognition of marginalized groups as members of a common world. The practical realization of security as emancipation requires the liberation of individuals from arbitrary structures that prevent them from living the life they desire (Wyn Jones, 1999; Booth, 2007). One of the main characteristics of emancipation is that it is based on the rights and needs of the most vulnerable individuals (McDonald, 2011). An emancipatory vision of security is holistic, non-statist, and de-emphasizes the use or threat of force (Booth, 1991). Since individuals' experiences of security and insecurity are strongly related to their access to water resources, it makes sense to use the critical concept of emancipation as a response to traditional and dominant security discourses (Harrington, 2014). Water security becomes then much more than adequate access to quality water supplies, though this is certainly a prerequisite. Harrington (2013) believes that emancipation of water security is based on three criteria: inclusion, communication, and cosmopolitism.

Inclusion

Inclusion means promoting a model in which disadvantaged groups, such as women, the lower classes, racial, national, and ethnic minorities, are involved in discourses and decisions about water security (Linklater, 2005). In fact, inclusion allows for a radical opening of the normative space of security by blurring the distinctions between insider and outside, citizen and non-citizen, self and other (Harrington, 2013). Inclusion is the necessary first step to allow "differently positioned people" to understand. They learn what takes place in different social situations and how social processes appear to connect and conflict from different points of view. Such an enlarged view better enables them to arrive at wise and just solutions to collective problems to the extent they are committed to doing so (Young, 2000).

In general, critical theory has made the necessary predictions about the rights and needs of vulnerable people; so that security for some should not be achieved or maintained at the expense of others (Harrington, 2013). To the extent that followers of the Frankfurt school of thought believe that science or theory should be linked to the interests of the oppressed classes of society (Riters, 2001). Critical theory seeks to understand the role of power, domination, and exploitation in society by researching contradictions, structures, practices, ideologies, relationships, and political beliefs (Fuchs, 2017). To this end, one of the important tasks of critical researchers is to confront individuals with power and expose repressive structures that oppress vulnerable people and create inequality (Guba and Lincoln, 1994). In fact, critical theory seeks an inherent possibility that can serve the interests of marginalized and neglected actors (Linklater, 1990).

Communication

Water security emancipation relies on a moral discourse in which individuals have the right to participate in decisions that may negatively affect them. The basis of these moral rules stems from the perception of the individual as a social being who "acquires his/her understanding simultaneously with the understanding of others through the act of communication" (Jacobs, 1995). In this regard, the theory of communicative action is one of Habermas's most well-known ideas in which actors communicate to reach a common understanding through reasoning, agreement, and cooperation. They use verbal action and dialogue for this purpose (Sattari et al., 2017). The key and central concept for understanding Habermas's communicative action is that the goal of actors in this process is only to "reach agreement". Therefore, if an action to achieve a goal is other than understanding, it is no longer considered a communicative action (Habermas, 2005).

According to Habermas, a rational and purposeful action seeks to benefit. Such action focuses on one-sided interests. While communicative action seeks the common and generalizable interests of individuals. He states that common values are formed based on such actions (Abbaspour, 2011). Communicative action, then, is not merely a verbal act, but a means of recreating society (Riters, 2001). In fact, through this theory, Habermas tries to prove that social conflicts should ideally be resolved without violence. To achieve this goal, a social system must be formed in which decision-makers and their implementation are made through unanimous reasoning (Habermas, 2005). In a more general sense, Habermas seeks a system of communication in which thoughts are freely expressed and defended against criticism (Mahdavi and Mubaraki, 2006). In fact, in communicative action, participants are given the opportunity to change their view of and their interest in the world if there is a better argument than theirs. The communicative action perspective has useful implications

that can open up society to persuasion and consensus using better/stronger arguments. If reason, identity, and community are created and perpetuated between minds, communication actors can be convinced that their positions and arguments are wrong in the face of better and conflicting perspectives (Risse, 2000).

Despite the new and unexpected changes that are taking place in water resources and the political structures that manage them; for the fair management of shared water resources, it is essential that a dialogue window be kept open (Linklater, 2005). Since the communicative action emphasizes the tools of reasoning and persuasion, this perspective can be used to overcome problems and issues that continue to hamper water security policies. These tools provide the moral and cognitive space to incorporate a variety of perspectives into water security discourses (Saravanan et al., 2009).

Cosmopolitism

The consequence of developing the first two components of water security emancipation is the expansion of the moral community of stakeholders. Focusing on cosmopolitism here as "interactive globalism" requires rebuilding political and moral boundaries away from defined boundaries toward a more global space in which no clear line can be drawn between inside and outside and insiders and outsiders. It is institutionalized that individuals should be mindful of the decisions that affect them. This allows more interaction and dialogue between humans to express concerns and vulnerabilities of shared water resources (Harrington, 2013).

Cosmopolitism demands from us to accept that we all belong as members of the global group. Globalism is about relativizing our place in the global framework, placing ourselves in relation to multiple communities and crossing territorial and social boundaries (Rumford, 2008). The main rules defining cosmopolitism: (1) all people are morally equal (2) arbitrary forms of power/domination should be avoided (3) the necessity of dialogue and participation in public affairs (Held, 2010).

Emancipation therefore provides the best opportunity for farmers to make their voices heard as important stakeholders in water security. It also allows farmers to create the conditions for more harmonious and ethical relationships on the water.

Change

The goal of critical theory is not simply to explain or understand society, but to change it (Fazliogullari, 2012). In fact, followers of the Frankfurt school of thought believe that critical theory not only has the role of describing the current situation, but should also help change the situation (Riters, 2001). Therefore, in critical research, "finding" and "change" are considered the "tool" and "goal", respectively. Change in this sense means making people critically aware of their situation and understanding change through action; an action that is achieved through conscious reflection (Freire, 1970). McDonald (2013) states that one of the goals of the research based on critical theory is to develop the praxis. In other words, such research is not only committed to identifying existing problems, but also helps to solve them. Therefore, farmers should be able to lead the current situation to the desired situation with full awareness of their position, understanding their important role in agricultural water decisions, and increasing their ability to solve issues related to agricultural water security. Of course, it should be mentioned that these changes will be implemented by means of formation of constructive communication and interaction with other actors.

The concept of agricultural water security from the perspective of the critical theory paradigm

According to the indicators mentioned for the critical theory, it can be argued that the concept of agricultural water security in the critical theory paradigm is the emancipation of the vulnerable farmers from various communicational, political, social, sexual, economic, and natural barriers. This release must be such that they can freely participate in water-related decision-makings and change the existing conditions to the desired conditions.

What methods does the critical theory paradigm offer to ensure agricultural water security?

Critical theory follows a dialogue and dialectical methodology. This feature refers to its interactive nature (Lincoln et al., 2011). The methods of critical theory paradigm make it possible to critically examine facts from a cultural, historical, and political perspective. Researchers using this paradigm typically produce qualitative data through open-ended interviews, focus groups, open-ended questionnaires, and observations (Scotland, 2012). The most important methods used in the paradigm of critical theory include critical discourse analysis (examines how social and political domination is realized in text and word), critical ethnography (a sensitive ideological orientation to the study of culture), action research (cyclical process of research, action, and evaluation that leads to change in action), and Ideology critique (determines the hidden ideology by revealing the participants' locations in the systems that enable or disable them) (Canagarajah, 1993). In the area of security issues, the questions raised are generally descriptive. These questions usually seek to understand what is

safe in the dominant order? whose security should be the topic of discussion? and who or what needs security (Curley and Ptiford, 2004).

There is a reciprocal relationship between theory, data, research questions, and interpretation of results (Talmy, 2010). Tasks such as unveiling reality, critically analyzing it, and recreating it are the responsibility of both participants and researchers employing the critical theory paradigm. Researchers do not make changes for participants, but they are with them (Freire, 1970). As a result, participants are involved in various research processes and stages such as designing question, collecting required data, analyzing information, and benefiting from the research (Creswell, 2009). Researchers use a shared approach to avoid the possibility of participants being marginalized. In other words, they involve participants in the form of questions, data collection, analysis, and etc. (Rizvani et al., 2009).

In fact, in order to assessment the perception of agricultural water security based on the critical theory paradigm, researchers should in an interactive flow examine farmers' (as a vulnerable community in the agricultural sector) perceptions of critical theory indicators that include emancipation (inclusion, communication, and cosmopolitism) and change. Given the fact that the first step toward effective policy should be to understand the heterogeneities that exist at the grassroots level, cultural theory can also be used to better analyze farmers' perceptions of heterogeneity about agricultural water security.

Conclusion

Positivism view of agricultural water security cannot solve the multi-dimensional and complex issue of agricultural water security; since positivists, with their human-centered and private-sphere point of view, have always dominated man over the nature, and their view of nature is instrumental. Therefore, in the current situation where the world is facing a shortage and insecurity of the water resources, they believe that consumers should act competitively in exploiting this rare and invaluable commodity. In this competition, the positivists do not pay much attention to the weak and vulnerable stakeholders. They believe that in this situation and in water-related decision-makings, governments should play a key role. Moreover, critics of both the positivism and constructivism paradigms believe that they merely explain and describe the status quo. In other words, they do not have a specific plan to change the status quo in order to protect the interests and emancipating deprived individuals and groups.

Therefore, conceptualizing agricultural water security from the perspective of critical theory paradigm can largely eliminate the mentioned shortcomings. Because from a philosophical point of view, this paradigm not only does not separate nature from man, but also considers them as components of a complex system that includes methods of production, social values, and ecological relationships. Water is a common resource whose unequal distribution has always led to inequality and class divisions between those in power and vulnerable farmers. Also, the main argument of the critical theory paradigm is that it helps to confront individuals in positions of power and exposes repressive structures that violate the rights of the deprived and create inequality. Thus, the critical theory paradigm provides the best opportunity for farmers to make their voices heard as important stakeholders in water security discourse. This can create the conditions for a more harmonious and moral relationship in the exploitation of scarce water resources. Another important feature of the critical theory paradigm is "change". This paradigm is not only committed to identifying existing issues, but also seeks to help address them. By being aware of their position and understanding the important role they play in agricultural water decisions, farmers will be able to contribute to increasing issues related to agricultural water security by increasing their capabilities. In other words, through this, they will be able to change the existing conditions to the desired conditions. Thus, conceptualizing agricultural water security from the perspective of critical theory is the emancipation of vulnerable farmers from various communicational, political, social, sexual, economic, and natural barriers. In this process, they will be able to freely participate in water decision-makings and be able to change the existing conditions to the desired conditions.

Author contributions

DH: supervision, data gathering, analyzing, writing the manuscript draft, and methodology design and checking the data. FA: data gathering, analyzing, writing the manuscript draft, and methodology design and checking the data. All authors contributed to the article and approved the submitted version.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher's note

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