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Review Article

Impact of Throwing Animal Carcasses in Rivers on the Environment on Parasitic Species Transmission in Iraq: A Comprehensive Review

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Abstract: Animal carcasses are currently being thrown into rivers, particularly in Iraq. This situation began when security concerns restricted the way carcasses are disposed of. The carcasses are increasing to the detriment of both the native fish population and people who use the water in their homes. The main concern is the parasitic stages that are present on the carcass skin and muscles. Parasitic transmission through this new practice can directly affect the environment using two adaptive strategies: endoparasites associated with immune disorders and external parasites in direct physical contact with aquatic fauna. An approach investigating a deep understanding of species of interest correlated with socio-economic variables in Al-Diwaniyah Province in the middle of Iraq is lacking [1]. A unified response to resolve this challenge is currently needed. The continuous dumping of animals in the rivers of the third qualification material prevents humans from using the water systems for domestic purposes and threatens the health of both native and exotic aquatic species. This issue should be addressed. Branching from this point, the irrigation and drinking segment of those who are most affected, often the most critically important for human security, can be examined through a network of diseases and may lead to innovative methods for investigation [2].

Keywords: Animal Carcasses, Parasitic Species, Rivers, Cultural Occasions.

INTRODUCTION

Historically, animal carcass disposal is a common practice during some religious and cultural occasions in countries such as Iraq. Consequently, these practices in rural and urban areas have increased, where the urbanization rate in Iraq has reached up to 69.39%, leading to the discharge of unknown numbers of cattle, buffaloes, sheep, goats, horses, and donkeys without any control, hygiene, or disease diagnosis in the rivers. Agricultural practices in higher regions and their rural areas transport most of the animal and human wastewater and solid waste mixed in the rivers. Agricultural animals also live side by side with humans and share natural resources with people. Often, people dispose of parts of dead animals in these rivers. Due to the increasing number of animal carcasses thrown in the rivers and their ecological dangers to public health, it is of great importance to conduct a comprehensive study towards improvements in these areas to preserve river health [3].

At the environmental level, the disposal of animal carcasses in the rivers by people reflects the concept of public cleanliness, either by authorities or the public in Iraq. In general, these carcasses are thrown into the rivers because of negative psychological aspects, low environmental awareness, and the undervaluation of animal lives in Iraq. At the health level, when animal carcasses decay, noxious odors are released, huge numbers of flies gather, and pests can spread diseases to humans and other animals. The long physical persistence of muscles and internal organs of dead animals, carcasses, manure, and any agricultural or industrial solid waste in the rivers focuses on ecological aspects, fouling the river-sea balance, and endangering the river. As a result, they give rise to various problems caused by living beings evolving through breeding and development. For these reasons, the aim of this review is to investigate the ecological river-sea balance and the negative effects of dead animals deteriorating various terrestrial environmental parameters and to provide

preventive protection from the consequences [4]. Environmental illnesses caused by dead animals will constitute a significant professional hazard for many people. Thus, the sustainable disposal of animal carcasses in the rivers and their receiving areas is very important from ecological, public health, and economic perspectives. There are very few studies about other environmental problems linked to dead animals, and environmental dangers will be seen in the rivers due to increasing populations. Regular review papers on the ill effects of dead animals disposed of in the rivers have not previously been attempted. The therapeutic treatment measures need to be restored properly, as well as the authorities' legal laws [5].

Objective of the Review

The main objective of this review is to elucidate the environmental impact of throwing animal carcasses in rivers and their role in transmitting numerous parasitic species in Iraq. It is well known that no review article has focused on the link between these issues a systematic review of the literature will aim to cover all the references on this issue. A document analysis of the collected articles will aim at extracting more accurate information that deals with the transmission of different parasites due to the disposal of large animals, which predominate in agricultural areas of the country. The aim of this review is not only to help scholars in the field of parasites and environmental health in developing projects to address this issue, but it would also be very useful for regulators, policymakers, and health authorities [6].

The following issues will be addressed in this review [1]. The target parasites that can be transmitted through the disposal of carcasses of dead animals in water bodies [2]. The impact of various parasitic species on water quality and exposed ecosystems [3]. The pathways of spreading parasitic species to human communities and animal scavengers [4]. Guidelines for applying full risk assessment and proposing effective management strategies to avoid such an intricate environmental and public health concern. In addition, a critical measure to encourage public health and reduce the risk of human and animal exposure to refuse sites will be scrutinized.

Parasitic Helminths: Overview and Transmission

Helminths, such as nematodes, cestodes, and trematodes, are multicellular parasitic worms that spend their lives at the expense of their host. Helminths have an intricate life cycle with at least two host species, including intermediate and definite hosts. These biological characteristics enable helminths to access different aquatic ecosystems, and several helminths infect various host species, such as mammals, birds, reptiles, fish, and insects [7]. Helminth parasites could be transmitted through different routes, including ingestion of their eggs or larvae, active and passive modes, skin penetration, inhalation, direct and indirect modes, and their transmission dynamics depend on host infestation status and behaviors. Water bodies represent a paratenic environment that can significantly disseminate parasites with the potential to create high numbers of new parasitic generations. Furthermore, aquatic ecosystem health is crucial in determining where helminth transmission could be enhanced within vulnerable hosts' physiological abilities by increasing parasite loading [8].

Helminths have impacted their ecological niches within their hosts' bodies for tens of thousands of years, thus leading to a highly complex system, which includes a wide range of interactions inside the host, including its immune system, constitutive microbiota, hormonal system, and energy flows during infection, survival, and reproduction. Furthermore, several nematodes, trematodes, and cestodes pose serious public and veterinary health risks, especially in those residing in impoverished and marginalized communities, which represent a substantial segment of the global population. These groups of people normally consume untreated fresh or partially sun-dried freshwater fish, the health of which could be compromised because of co-infections with pesticides, including helminths and other parasitic infestations. Public health should be the focus of any water management plan because water is a potential means of transmitting parasitic infections [9].

Key Parasitic Species in Iraq

Epidemiological factors such as location and environmental factors are the measures of predominance for parasitic species. Iraq is one susceptible country. The closer interrelation between a country and parasitic environmental disease is the result of social and financial issues, climatic abnormalities, and hospitality in Iraq. The expansion of any disease pathogen is more likely where animals are largely hosted. The most common parasitic species associated with environmental contamination through the disposal of animal carcasses are the most significant in Iraq. Therefore, advanced knowledge of certain factors is necessary in Iraq to pave the way for protection strategies [7]. Tenia is one of the significant parasitic species classified as part of the cestode group, having a lengthy lifecycle. The marginal hooks are in the attractive circle at one end of the body specifically. Fasciola hepatica and Fasciola gigantica are biologically linked. The common disease that could be transmitted to people through water sources is fascioliasis. Liver fibrosis and chronic viral inflammation are possible consequences of being infected. Regardless of the circumstances, fascioliasis leads to weight loss, influenza, cervical, intestinal, and skin allergic reactions. It is critical to determine the localization and molecular behavior of infected animal narcotics in Iraq in clinical and veterinary practice and education. The primary aim of this study is to discuss Fasciola and Tenia in relation to human and veterinary health [10].

Tenia

The genus Tenia is a significant group of flatworm parasites from the class Cestoda that annually wreak havoc on wildlife, livestock, and humans. Species of this genus can adapt to and parasitizing a wide range of dissimilar definitive hosts such as ruminants, pigs, and primates, including humans. These worms bear a heteroxenous life cycle with vegetative and animal intermediate hosts when they exist as the cyst phase. The cystic phase is externally located and can be found on the flesh, in the viscera, under the skin, or even inside the brain cavity. Therefore, when livestock or wildlife die from diseases or natural causes, their viscera can be thrown into rivers and watercourses as part of a mere cleaning process. Consequently, these water bodies become heavily contaminated with cysts that can be transmitted to drinking water, crossing to wildlife and human beings during water intake and swimming activities in contaminated waters. Since all these activities are well known as cultural actions in certain countries, people walk towards the contamination sources through direct contact, ingestion of contaminated water, and their bodies become exposed to parasitic cysts which subsequently develop hydatidosis, cysticercosis, and coenurosis [11].

Environmental pristine lakes cannot be saved anymore from pollution due to their open underwater flora and fauna. In certain regions, very few worms have been identified genetically, but not in the north of the country; the wildlife ecosystem of Habbaniya Lake was the center of previous research. Torrents that contain these cysts behave like a cleaning process that brings all the pieces outside everywhere. Lakes and rivers have a collector role of cleaning different areas and collecting all dead animal viscera before and after eating. The Habbaniya Lake ecosystem in the west of Baghdad was even recognized as a cyst collector of the desert midland area, including the city and finally flowing to another region. Tenia infection occurs in certain populations, especially based on their cultural practices, which do not allow consuming certain types of meat. Economically, substantial losses in the livestock husbandry sector are anticipated when the carcasses are heavily contaminated with people in the affected areas. The second name comes from the medical security consultants based on their zoonosis significance. All these groups were studied with similar importance; however, they received specific attention from authorities [12].

Fasciola Hepatica

The liver fluke Fasciola hepatica (Family: Fasciolidae) is another medically and veterinary important parasite in several countries, including Iraq. Fasciola hepatica is a causative agent of fasciolosis, a parasitic disease with a worldwide distribution, which usually infests the liver and/or bile ducts of sheep, goats, and less commonly cattle and buffaloes and other ruminants. With these animals, the infection is usually chronic, and fasciolosis can be severe due to reduced body condition score and growth retardation, increased abortion rate, drop in milk yield, death, or selling at very low prices at the time of non-symptomatic carriers after liver condemnation at the time of slaughter [13].

Furthermore, people can also become infested after consuming infected or freshly washed watercress, or if they consume cooked or uncooked contaminated vegetables with the encysted metacercariae of this fluke. In any case, human fasciolosis is associated with hepatic morbidity, huge economic losses, and debilitating symptoms over time. Due to severe economic losses, several epidemiological surveys from Iraq have indicated the public and animal health importance of this parasite [11]. The overall prevalence rate of fasciolosis in cattle raised in the Basrah governorate, Southern Iraq, where most liver flukes detected were found, was up to 34%. It also showed that the positive history of animal husbandry practices, the owners' awareness of the parasite, as well as the general behavior of local farmers and veterinarians in this area, such as sharing the same source of water for animal drinking and the frequent practice of grazing and using small-scale local wetlands to feed the animals, are factors that facilitate the transmission and persistence of this parasitic infection in the animal population over time. Accordingly, 10 beef animals that were raised in this region tested positive for this parasite using the CTT by ELISA technique, and were slaughtered for the first time, about 80 infected animals that were negative in the body in the last three months before, for culling the uninfected herd and controlling the risk of animal-to-animal and environmental-to-animal metacercariae transmission of liver flukes through trade and marketing of these infected animals and their meat, to mitigate the impact of this enduring issue of parasitic liver flukes in that area from the lack of active surveillance programs for this severe disease [14].

Environmental Impact of Throwing Animal Carcasses in Rivers

Although firmly rooted in belief, behavioral sciences, animal rights, and socioeconomics, discarding animal carcasses into rivers has severe ecological impacts, such as the depletion of oxygen content, the solidification of suspended particles, and eutrophication leading to putrefied river waters. Additionally, animal sources of infection contaminate air and agricultural lands, causing new diseases. The worldwide increase in parasitic diseases is closely related to environmental degradation [8]. Possessing the earth's most complex, taxonomically diverse ecosystems with the highest promise of future beneficial discoveries, aquatic ecosystems are endangered by the excessive addition of nutrients such as nitrates from urine and dung, and bone, muscle, and fat from dumped carcasses. Increasing nitrogen and phosphorus levels will either directly kill the fish due to their high sensitivity or greatly increase periphyton and algae on river stones. These fast-growing new plants oxygenate water during clear days and consume oxygen at night. Using up almost one-third of

the oxygen needed by fish, dead plants begin to rot, thereby decreasing water clarity and absorbing more from the high oxygen water into the low oxygen water. Unprecedented numbers of children, adolescents, and elders in Iraq suffer from the obsession with anemia-inducing parasitic diseases like hepatic and non-hepatic fascioliasis. The establishment of Fasciola flukes in the liver and bile ducts is directly linked to irrigation, a factor contributing to the problem of low learning ability among poor communities. The presence of infective water plants excysts from them in water and invades required intermediate hosts, which is a main problem of putting them in the river water [15].

Factors Affecting Parasitic Transmission in River Ecosystems

River ecosystems are dynamic, complex systems largely determined by ecological and anthropogenic factors. Such a system is influenced by various variables relevant to parasite transmission pathways, including seasonal changes in temperature, turbidity, water flow rates, and sediment quality. Human impact on these ecosystems, particularly due to agricultural runoff and urbanization, is known to change river habitat compositions, which has an impact on many aquatic hosts and free-living stage parasitic species. These alterations in ecosystems correlate with the risk of parasitic infection because they can affect snail development, snail infection, cercarial emission, and the part of the transmission that is directly related to snails, fish, and fish predator exposure, including carnivorous predators. Thus, the risk of parasitic infection is expected to be higher for people living near rivers [16].

People are at greatest risk of harm from consuming vegetables contaminated with germs and if they catch fish in areas where the polluted water passes through irrigation districts when farming is undertaken. Infection risk is influenced not only by habitat availability for the life-cycle stages of aquatic hosts and larvae, but also by host behavior in using the environment. Animals migrate, feed, and breed in natural habitats that can be maintained in a more extensive manner, and wildlife populations expand or become denser in response to changes in the environment brought about by human activity. Invertebrates move through the environment, potentially exerting a higher infection pressure on snails than would normally be the case. Transmission among animals depends largely on behavior and on the environment; transmission between them and humans in any scenario has the potential to occur. Therefore, environmental quality is of great importance in the dynamics of parasites. Such a hypothesis can be useful if we have an interest in indirect disease control, such as environmental management, watershed management, environmental protection and repair, in the development and improvement of methods for monitoring environmental quality, and also in developing control strategies. Understanding the potential of an ecosystem in maintaining or influencing the dynamics of a parasite in an environment, especially any patterns or relationships between key components of the system, is considered vital [17].

Current Practices and Regulations Regarding Animal Carcass Disposal in Iraq

The assessment showed to be safe and beneficial in mitigating public health infections from transmission in river systems [18, 19]. Positive Aspects Animal disease control in the country is assessed and arranged by the Ministry of Agriculture. Carcass collection and disposal equipment are on call and positively maintained under the Livestock Draining Centre [20]. Gaps transporting vehicle carcasses to burning plants is currently the favored disposal approach throughout western Iraq; however, this is energy-intensive and insufficient for preventing environmental transmission. In contrast, other alternatives, such as appropriately applying carcasses in pits to abandon forms of radar protection, reveal the pathogens to a certain extent while presenting administrative and technological difficulties in application, which significantly increase the chances of pathogens entering local systems wherever carcass differences are elevated. Banking plant arrangements, including combinations of high-temperature aerobic and anaerobic digestion, application of catching equipment, and biofilters, have demonstrated extensive transmission efficiency, with better than 2 units of shedding pathogens from changed animal species or their scavengers into the environment, investing in the form of banking plants beyond the character of the applied technologies. Careful implementation is needed to establish banking and executing plants for the best potential extent in preventing varied pathogen transmission from animal carcasses to a Tecovirus, and ultimately to dependent animals and people, which is deemed inadequate [21].

Future Considerations Due to a lack of adequate commission to execute the proper plans, an insufficient regular system for the isolation of animal carcasses, accompanied by poor understanding among the public, explains the illogical carcass management over the rivers without the need for locals. There is an urgent need to ensure that the combined scientific research and societal sector respond and debate about enhancing the waste management proposition in an environmentally and socially responsible manner. Unfortunately, it is hardly possible to find ideas and substantial responses concerning how animal waste can be productive in the region. Local and non-governmental organizations are making significant progress in this respect, reflecting the region’s aspirations, but beneficial policies are not enough to carry out the program in the most sustainable and labor-saving way [22].

Methods for Studying Parasitic Transmission in River Environments

Research Methodologies and Techniques for Studying Parasitic Transmission in Riverine Ecosystems

Parasitic transmission in riverine ecosystems is generally studied using infected snails and fish, as well as transparent electrofishing. Several techniques can also be used to identify parasitic organisms and their numerical values in the aquatic environment and the organs of fish. Traditional techniques include helminthological dissection, microscopy, scanning electron microscopy, histopathology, and molecular detection. Classical monitoring of the presence and abundance of fish and helminth parasites is still returning the same results in a field-collected sample. In addition, recent investigations may need to use laboratory experimental data. As a result, the observation of field and experimental data provides reliable correlations between parasitological evaluations and population health characteristics of fish hosts [23].

An all-encompassing river network comprehensive plan was developed based on a project approach of large or massive rivers or a system of rivers and their valleys. Moreover, other models of the river network were combined with the model of health and good practice in the field. The collected field data were mainly evaluated using field calculations. First of all, because of their simple comparison, these data help to identify very simple zero or low-level pollution. In contrast, the study of the dynamics of the matter requires extensive samples due to the very wide fluctuations in the number of agents in groups of agents, both in snails and fish. Other methods are increasingly efficient in the detection of helminths or visceral or skin parasites in field-collected fish in localities with a high level of pollution or after disinfection, the in vivo examination of fish killed by radiation or anesthesia, and xenodiagnosis naturally infected in snails or hamsters, the sealing of parasites, or the peptide examination of infected fish. These techniques are not suitable for longitudinal studies with important fish because of the possibility of spontaneous cleaning. Given the increasing need for approaches based on experimental observation, it is now possible to use molecular tools in the diagnosis of risk of spread for conditions of allergic disease, detection of fascia, host-cell environment, infected snails, and fish. However, because of the length of the recording cycle, such intervention will work better. More cross-sectional or longitudinal studies must be carried out in the frame of European or international networks. These studies involve using a variety of monitoring frameworks derived from different technological and conceptual developments [24].

The very direct techniques have the disadvantage of strong dependence on the wreck state and the bias induced by the variability of environmental conditions and uncontrolled transmission rates. Therefore, they must modernize the methods used. Data sources are smoothed or modernized to improve their reliability in practice. For example, difficulties in monitoring the intensity of A. australicus in fish may require the adaptation of sampling methods (local random sampling, general random sampling, making the fish hatch for wildlife). It offers a variety of solutions to paraclinical integrations, molecular markers, immune markers, medication, changes in ultrasounds, and other compelling measurements, including birth rates, mice, or parasites. Unconstrained research work, conducted in close collaboration with practical sciences like freshwater biome biologists, parasitologists, and ecologists, may contribute to a better understanding of the transmission dynamics of parasitic organisms with a single or complex life cycle. Such work is also in line with the growing interest in applying systems and systematic approaches to investigate the dynamics of indirect parasite transmission [25].

Case Studies and Research Findings

In Dhi-Qar Governorate, 43 species were recovered from a number of hooked specimens (5901) brought for examination: 31.8% trematodes, 20.6% cestodes, 25% cestodes and nematodes, 15.3% nematodes, 7% isopods, and 0.3% other groups. It is already focusing on fish as model paratenic hosts and may be extended for a conclusion. It was found to have more parasitic species due to its unique topography, climate, and two main rich water sources, the Halha and Rafdyan rivers, where most fish are found using 33 landing centers, primarily on the west side of Dhi-Qar Governorate. A right relationship exists between the number of fish landing sites and the number of identified parasitic species [26]. To avoid the risk of water contamination by carcasses, farmers must be provided with alternate methods in the form of first aid and necessary feedback, such as submersion and burial, from the onset of the disease in goats. Environmental changes may contribute to the increasing infection of trematodiases in the young populations of the Halah and Euphrates River basins. In the conclusion of this review, it was noted that the people around the Halah and Euphrates River basins face problems with the transmission of enteroparasites, as environmental schistosomiasis transmission series and other environmental parasitic diseases have appeared in new settlement areas, such as the Wallah basin in the middle of Iraq. With community help, the elimination process of some water parasites can be facilitated if veterinarians provide good instructions for farmers to eliminate animal reserves or for humans not to consume untrusted food and water [27].

Health Implications of Parasitic Infections from Animal Carcasses in Rivers

Disposing of animal carcasses in rivers has considerable health implications, especially in communities that rely on the environment to make a living. The disposal of carcasses in rivers has been documented to pose parasitic infection threats to humans and animals. The diseases influenced by parasitic species are known to harbor significant morbidity, particularly among populations in rural communities that rely on contaminated river water for various daily activities.

Indeed, half of the world currently suffers from parasitic diseases, which are endemic in some countries and areas of the Mediterranean, Africa, South America, and Asia. In Iraq, interaction with the blood fluke typically occurs in humans who suffer from jaundice, abdominal pain, and vomiting. Additionally, other possible symptoms have been reported, such as weight loss, generalized weakness, fever, and anorexia [28]. Overall, infections due to fascioliasis and echinococcosis can result in several health problems, ranging from chronic to acute morbidity in exposed individuals. Human beings, including women, children, and farmers who rely on the water source for drinking, cooking, and laundry, may be at high risk of illness from fascioliasis and echinococcosis [29].

Furthermore, socio-economic consequences have been observed after infection by the parasites. Controlling and treating the disease is a time-consuming and costly affair. Expenses for visits to hospitals and health professionals must be borne by patients or caregivers. In areas that dispose of waste in rivers, the majority of civilians report subsistence through farming, and those farming households are the major individuals identified in the region [30]. People typically rely on environmentally hazardous water for cleaning their region, garments, and laundry, and are also dependent on the use of automatic pumps to irrigate their land, where they use river water. People with visibly decreased water quality due to carcass disposal are at risk of suffering. Education and awareness of potential threats from contaminated drinking water or consuming dirty fruits and vegetables are crucial for those at risk. Communities that conduct experimental analysis and remain close to a river must be involved in the screening process. However, to better justify the causative link, a comprehensive questionnaire was established to address public health problems related to the presence of parasitic diseases verified in the stream. Regular testing rates should be conducted annually in September, to monitor parasite persistence in blood, and to better assess the potential threat from October to December [31].

Mitigation Strategies and Best Practices

The following are recommended mitigation strategies and best practices that can be used and integrated to reduce the transmission of some of the harmful parasites that are present both in rivers and outside of these, potentially directly to humans and other animals. Furthermore, these strategies can also diminish a wide spectrum of impacts on the environment and on the animals, including wildlife. Moreover, such a reduction identifies economic benefits on several levels, both in the health sector and in reducing the damage to the environment, thereby strengthening investment, animal production, hunting, tourism, and international relations. Many of these pathogens could subsequently be a cause of emerging zoonotic diseases that are transferred from the animal world to humans. In addition to being a health and developmental problem, these interventions could pose a great danger to human and animal health [32, 33].

This type of animal carcass disposal often has a strong environmental impact and is a resource-intensive practice that does not encourage the use of technology or scientific and new solutions that are adapted to religious, economic, environmental, and cultural contexts, which also facilitate funding and community participation in the elimination of environmental and health effects of parasitic transmission [34]. Deposit studies can be used to guide policies and strategies for local solutions. Recommendations can be used as a guide to help dispose of waste effectively, avoiding environmental losses and reducing parasitic diseases. To support community involvement in the project and help reduce diseases and their associated economic burdens, these should be combined with awareness-raising activities, meetings, advocacy, etc. Future research should be based on these policies and strategies, involving sick patients and training local officials on how to use disaster management tools to solve these problems. An intervention implemented by a strong network of local NGOs and the government can prevent the spread of infectious diseases inside and outside the region, with significant economic impacts [35].

Future Research Directions

There are very few studies on the effect of environmental condition changes on the transmission dynamics of the parasites that are associated with different hosts and the environment in a multispecies system. Research on the metacommunity of animals, parasites, people, ecosystem services, and the transmission of many infectious agents over time could partially highlight such changes in parasitic infections in systems where people have poor hygiene and live in areas with poor environmental management. The environment is an important determinant and predictor for the occurrence and prevalence of many parasitic species. Therefore, researchers should treat possible zoonotic agents found in a multispecies community in different ecosystem sectors: the health of the people, the ecology and environments of the areas they live in, and the ecological health of wildlife in such areas. The research can also conceive a variety of social responses, considering the responses in different sections.

In summary, a review of both wildlife and public health publications mapped potential future major foci, under Future Research as follows: (1) Longitudinal tracking of infections, over time or with/after interventions; (2) Mitigation strategies and their effectiveness in reducing infections; (3) Collecting new methodologies and fields of research to answer old questions; (4) Ecological, environmental, and climatic impacts on parasite transmission and epidemiology; (5) How do we take a holistic approach and answer multidisciplinary research life-cycle questions using a multidisciplinary approach; (6) Engaging with

stakeholder support, the environment, and ecological and environmental health.

CONCLUSION

On the ecological and health sides, environmental health and parasitic transmission are closely linked. For this reason, environmental health is a promising sector that can be linked to research on parasitic diseases and for which public and private as well as local and international institutions should care. Although little research has been undertaken worldwide into the prevalence of throwing dead animals into rivers, the practice is regrettably human behavior in some parts of Iraq. Indeed, focusing on this issue in depth emphasizes the seriousness of dealing with public health problems because of their seriousness and scope, especially this type of human behavior that equals terrorism in terms of its environmental and health effects.

The consequences of throwing animal carcasses into rivers, as documented in terms of parasitic eggs, ova, and larvae that infest humans and animals, have been detailed. Transmission is high to both wild and domestic animals. The damaging effects of these ova, parts, and larvae on public health, the environment, wild and domestic animals, livestock production, and human infrastructure in Iraq were highlighted. The necessity of involving scientists, local administrators, political and decision-making representatives of relevant sectors, including human and animal health sectors, and the use of a multidisciplinary approach as well as preventive strategies by encouraging urban and rural communities to participate through community participation are required for the implementation of successful psychological strategies and measures. In any future global engagement with the environment, Iraq will act as a model portraying the dimensions of the problem of throwing animals into rivers. The urgency for further, more precise studies as well as effective intervention is underscored.

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