

Examining the Influences on Human-Animal Relationships in the Era of Artificial Intelligence

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Abstract: With the development of biotechnology, artificial intelligence and robotics, animals are not only part of the natural ecology, but also become the object of scientific research. At the same time, global climate change and ecological crisis are reshaping the interaction between humans and animals. This study explores the historical evolution of the relationship between humans and animals, analyzes the changing roles of animals in people's lives under different social and cultural backgrounds, and the impact of technology and environmental factors on this relationship. This study finds that while technological progress has improved productivity and medical research, it has also brought ethical and ecological challenges. In addition, the rise of artificial intelligence and robotic animals provides new ways of companionship and protection, but its impact on traditional animal identity cognition has not been fully resolved. Future research needs to combine primary data to explore how to balance innovation and sustainability in the formulation of animal-related policies to ensure that technological development is coordinated with ecological protection and ethical responsibilities.

Keywords: Human-animal relationship, technology and animal interaction. animal protection, sustainable development

1. Introduction

The study of human-animal relations has developed across disciplines. Early anthropologists such as Taylor and Fraser explored the symbolic and mythical roles of animals, while scholars such as Levi-Strauss and Douglas examined their role in social categorization [1]. More recently, Marvin and McHugh have analyzed topics ranging from animal rights to artistic representation [2]. Human-animal studies challenge binaries such as nature and culture, emphasizing interconnectedness [3]. The emergence of modern biotechnology, artificial intelligence and robotics has made animals not only part of the natural ecology, but also objects of scientific research, carriers of pet cloning, and even AI-driven bionic products. At the same time, global climate change and ecological crises have further reshaped the way how people interact with animals, and the reduction of wildlife habitats and changes in migration patterns have led to the need for human societies to readjust their animal protection policies and ethical concepts.

Therefore, studying the evolution of the relationship between humans and animals not only helps to understand the process of social development, but also provides valuable references for contemporary animal ethics, ecological protection and technological applications. This study aims to explore the historical evolution of the relationship between humans and animals, analyze the changes

in the role of animals in human life under different social and cultural backgrounds, and reveal the impact of technology and environmental factors on this relationship.

2. The Impact of Scientific and Technological Advancements on the Evolution of Human-Animal Relationships

2.1. Scientific and Technological Progress in Agriculture and Animal Husbandry

The scientific and technological progress of agriculture and animal husbandry has profoundly changed human and animal relationships. From traditional agriculture to modern animal husbandry, the application of mechanization and genetic engineering has dramatically improved production efficiency, but also brought about controversies in animal welfare and ethics. In traditional agricultural societies, animal husbandry depended on natural resources and animals were mainly used for labor, food and economic exchange. With the development of technology, mechanized equipment (e.g., automatic milking machines, feed distribution systems) has reduced humans' direct dependence on animals and made production more efficient [4].

The rise of genetic engineering technology has further advanced the livestock industry, with gene editing techniques (e.g., CRISPR-Cas9) being used to breed livestock that are more resistant to disease and higher in meat and milk production [5]. Scientists have successfully created hornless cows through genetic engineering to improve meat quality and development rates while lessening the suffering associated with dehorning.

2.2. The Rise of Animal Welfare and Ethical Discussions

2.2.1. Biotechnology and Cloning Technology

Human-animal relationships have been significantly impacted by developments in biotechnology and cloning. When Dolly the sheep was born in 1996, cloning technology gained notice for the first time. These days, this technology is employed in fields including livestock breeding, endangered animal conservation, and pet cloning. In terms of pet cloning, some companies provide services of cloning cats and dogs, such as ViaGen Pets in the United States and China's Sinogu Company, and the cost of cloning a pet is up to tens of thousands of dollars [6]. This technology fulfils the emotional attachment of some people to their deceased pets, but it has also sparked controversy about the uniqueness of life and animal welfare. It is still uncertain whether the clones' behaviour and feelings can be precisely reproduced, despite the fact that they are genetically similar. In endangered animal conservation, scientists have attempted to clone extinct or endangered species. However, the technology still faces challenges such as loss of genetic diversity and uncertain ecological adaptation. In addition, cloning is also being used in agriculture, for example to improve the reproductive efficiency of dairy cows or pigs to meet meat market demand. However, the large-scale use of cloned animals may have unknown effects on natural ecosystems. Therefore, although cloning technology has brought new opportunities for human-animal relationships, it has also triggered debates on ethical and ecological risks.

2.2.2. Technology's Reshaping of Animal Identity

The development of science and technology has led to a fundamental change in the identity of animals in society. From traditional "natural creatures" to experimental objects, animals have been assigned different functions. For example, in the medical and pharmaceutical industries, laboratory animals have long been used for disease research and the testing of new drugs. Species such as mice, rats, rabbits and rhesus monkeys are widely used in biomedical experiments to ensure the safety of drugs

for humans. However, as animal cognitive research has intensified, society has raised more questions about the ethics of laboratory animals. For example, studies have shown that primates and certain mammals possess advanced cognitive abilities, being able to perceive pain and even have social emotions. This discovery has prompted the scientific community to gradually adjust the norms for using laboratory animals. For example, in 2013, the European Union banned animal testing for cosmetics and encouraged the use of alternative methods, such as organ-on-a-chip technology, to mimic the human physiological environment and reduce reliance on animal testing [7].

Changes in animal identity are also reflected in genetic engineering experiments, such as CRISPR technology being used to edit animal genes to make them research models for human diseases. For example, scientists have used gene editing technology to create Alzheimer's mice and Parkinson's disease primates. While such technological developments have accelerated medical advances, they have also triggered a re-examination of the ethical status of animals. Thus, technology is not only affecting the way people interact with animals, but it is also reshaping people's perceptions of animal identity.

2.2.3. Artificial Intelligence and Robotic Animals

With artificial intelligence and robotics development, robot pets are gradually becoming a substitute for animal companions [8]. For example, Sony's Aibo robot dog and China's smart cat toys can simulate animal behavior and interact with people. For older people or people with allergies, robotic pets offer an alternative to feeding and care. In addition, robotic animals are also used for psychotherapy, such as Paro, a seal robot developed in Japan, which has been widely used for the psychological comfort of Alzheimer's patients. However, it is still controversial whether robotic pets can truly replace real animals. They lack the unpredictable nature and emotional communication skills of real animals, yet they can also offer some degree of companionship and lessen loneliness. Furthermore, utilising synthetic animals could alter how people feel about real animals and erode the bond between people and genuine animals [8].

Artificial intelligence is not only being used to create robotic pets, but also to simulate wild animal behavior. For example, AI is used to monitor wildlife migration patterns, simulate predatory relationships in ecosystems, and even recreate animal behavior in video games and virtual reality (VR). These technologies not only improve people's knowledge of animals, but may also influence cultural and social interactions. For example, the anthropomorphic design of virtual animals in the movie Avatar has made human perception of natural ecology more immersive, and AI-assisted ecological research has helped formulate more accurate conservation policies. Overall, the development of AI and robotic animals is transforming the emotional relationship between humans and animals, as well as shaping new patterns of social interaction. However, how to balance the relationship between technology and real animals is still a question worth pondering.

3. Impacts of environmental climate change on human-animal interactions

3.1. Impacts of Habitat Destruction and Animal Migration on Human Society

Habitat destruction is an important factor leading to animal migration and tensions between humans and animals. Urban expansion, deforestation, the disappearance of wetlands, and intensified agricultural activities have deprived many species of their original living space and forced them into human societies. In India and Southeast Asia, for example, the reduction of forest habitat due to large-scale cultivation of palm oil has led to the frequent entry of elephants into villages to forage for food, destroying farmland and causing human casualties. This "human-elephant conflict" has become a major issue in global biodiversity conservation. Animal migration can exacerbate public health crises, as habitat loss forces wildlife, such as bats, to move closer to human populations, and they are natural

hosts for many viruses, such as Ebola and the New Coronavirus. As a result, the forced migration of wildlife increases the risk of zoonotic disease transmission. For example, forest fires in Australia in 2019 led to the mass migration of animals such as koalas, making animal rescue and outbreak prevention and control a huge challenge.

In densely populated areas, wildlife migration can also affect infrastructure and urban ecology. For example, in North America, suburban sprawl has led to increased traffic accidents, as coyotes (Coyotes) and deer are frequent cities. Thus, habitat destruction not only affects the stability of ecosystems, but also has far-reaching consequences for the security of human societies, agriculture, health, and infrastructure development.

3.2. Ecological conservation policies and the reshaping of human-animal relationships

In the face of climate change and habitat destruction, countries worldwide are reshaping the relationship between humans and animals through ecological conservation policies. Many countries have established nature reserves, wildlife corridors and ecological compensation mechanisms to reduce human impact on wildlife habitats. For example, the "Elephant Corridor" project in Africa allows elephants to move freely between countries to reduce human-elephant conflict and promote ecotourism. At the international level, the Convention on Biological Diversity and the Paris Climate Agreement emphasize the importance of ecological protection for global climate response. For example, China's "ecological red line" policy restricts industrial and urban development to protect critical ecosystems and restore habitats for endangered species. In Europe, rewilding programs are being implemented to restore ecological balance and reduce human intervention by reintroducing top predators such as wolves and bison [9].

Policies are also driving an ethical shift in human-animal relations. For example, the European Union and some countries are restricting industrial animal agriculture to reduce the environmental impact of livestock rearing, while promoting plant-based diets and lab-grown meat to reduce dependence on animal resources. Overall, ecological conservation policies are not only a means of combating climate change, but are also changing human attitudes towards animals and moving human-animal relations towards more sustainable and harmonious development.

4. Urbanization and human adaptation to animals

4.1. Wild Animals Entering Cities

With the acceleration of urbanization, the entry of wild animals into cities has become a common phenomenon worldwide. This phenomenon is largely driven by urban expansion, habitat loss, and the attraction of food resources. In order to promote the coexistence of humans and wildlife, many cities have adopted innovative strategies. Singapore has adopted the design of "eco-corridors" to connect green spaces, wetlands and nature reserves, providing safe passage for wildlife and reducing direct conflicts between humans and animals. Los Angeles has built "wildlife bridges" to help large mammals such as cougars cross freeways safely. In addition, some cities have implemented "smart animal management" systems that use AI cameras to monitor wildlife activity and develop appropriate management measures. However, introducing wildlife into cities also poses new challenges, such as the spread of disease, property damage and personal safety issues. Therefore, future urban management needs to balance ecological protection and public safety to realize a true "human-animal coexistence" model.

4.2. Ethical Challenges of Human-Animal Interaction under Environmental Change

Environmental change leads to profound changes in human-animal relationships and raises new ethical challenges. For example, extreme climates have led to the shrinking of wildlife habitats, and many species depend on food resources provided by humans for their survival. In this context, whether humans should actively intervene to protect animals has become a focus of ethical controversy. For example, rising global temperatures have led to the melting of Arctic glaciers, forcing polar bears into human communities to forage for food. Some environmental organizations advocate artificial feeding to sustain their survival, but others worry that it will alter the animals' natural behavior and exacerbate human-animal conflict.

Animal welfare issues are also of widespread concern, and the sustainability of livestock farming is being challenged as the environment changes. For example, global warming has led to an increase in heat stress in livestock, which reduces productivity, and the livestock industry needs to adopt new ways to safeguard animal welfare, such as improving the feeding environment or adopting genetic improvement technologies. However, the ethicality of such technological approaches remains controversial. Another ethical challenge is the issue of "species management". Climate change is causing some exotic species to flourish rapidly in new environments, threatening native biodiversity. In Australia, where rabbits and toads have proliferated as a result of warming, the government has resorted to culling to control them. However, whether mass culling is ethical for animals has sparked a global debate. Thus, the ethical issues of human-animal interactions in the context of environmental change are becoming increasingly complex, and there is an urgent need for a more comprehensive ethical framework to guide decision-making.

4.3. Human-Animal Coexistence in Extreme Environments

Climate extremes are affecting the ways in which people and animals coexist, posing serious challenges to traditional animal husbandry and hunting cultures in particular. In recent years, many parts of the globe have experienced extreme heat and drought, leading to reduced pasture production, water shortages and livelihood crises for communities dependent on pastoralism. In the Sahel region of Africa, for example, persistent drought has forced pastoralists to change their traditional grazing practices or even migrate to cities in search of new livelihoods. Similarly, high temperatures in the western United States and Australia have led to increased livestock mortality, prompting farmers to adopt drought-resistant feeds or reduce the size of their livestock operations.

At the same time, extreme weather conditions are also affecting the global hunting culture. For example, the melting of sea ice in the Arctic due to warming has deprived the Inuit, who rely on ice for hunting, of their traditional hunting grounds. Many communities have had to adapt their hunting strategies or even turn to fishing and modern animal husbandry. In addition, the destabilization of the ecosystem has led to the decline of certain prey populations, such as the Canadian caribou, which directly affects the livelihoods and cultural heritage of local Aboriginal people. In response to these challenges, humans are adopting a variety of adaptation strategies. For example, sustainable animal husbandry techniques, such as water-saving feeding systems and drought-tolerant pasture cultivation, are being promoted, while community-supported agriculture (CSA) models are being developed to reduce reliance on traditional animal husbandry. In terms of hunting culture, some communities have passed legislation to strengthen animal protection, while developing ecotourism as an alternative to the economic benefits of hunting. Thus, the way humans and animals coexist in extreme environments is undergoing major adjustments, and more sustainable strategies may be needed in the future to alleviate environmental pressures.

5. Conclusion

In conclusion, the evolution of the relationship between humans and animals reflects widespread changes in society, technology, and the environment. Scientific and technological advances have transformed human-animal interactions, from traditional agriculture and animal husbandry to biotechnology, cloning, and artificial intelligence. These innovations have not only improved productivity and medical research, but have also raised ethical and ecological issues, prompting people to reconsider animal welfare and the role of animals in human society. In addition, the rise of artificial intelligence and robotic animals has brought new dimensions to the relationship between humans and animals, providing alternatives for companionship and conservation work, while challenging people's traditional views on the identity of animals. However, the ethical and emotional impacts of replacing real animals with artificial substitutes remain unresolved. Finally, environmental changes, including habitat destruction and climate change, have also significantly affected the relationship between humans and animals, bringing new challenges.

However, this article only used literature for analysis and lacked qualitative research observations. Future studies should incorporate primary data and explore how to balance innovation with sustainability in animal-related policymaking, ensuring technological progress aligns with ecological protection and ethical responsibility.

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