TOWARD ECOLOGICAL JUSTICE: A SOCIAL WORK PERSPECTIVE ON LEVERAGING ARTIFICIAL INTELLIGENCE FOR ENVIRONMENTAL MONITORING AND CONSERVATION

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Abstract

The use of cutting-edge technologies like artificial intelligence (AI) into conservation efforts has created new avenues for ecological resilience as the world's environmental deterioration worsens. This study looks at the relationship between social work's Ecological Systems Theory (EST) and AI-powered environmental monitoring and conservation initiatives. It makes the case that AI can improve our comprehension of the interrelated layers that affect environmental wellness when integrated into a systems-based approach. We suggest a framework that stresses the ethical, community-centered, and sustainable application of AI for ecological preservation by coordinating AI interventions with the micro-to-macro levels of EST.

Keywords: social work, artificial intelligence, environmental justice, ecological systems theory, community empowerment

Introduction:

Environmental Crisis as a Social Work Concern

Environmental issues such as climate change, deforestation, and biodiversity loss are no longer peripheral to social work practice—they are central to it. Vulnerable populations, including Indigenous communities, low-income groups and communities of color, are often the first and worst affected by environmental decline. Social work, with its focus on systems thinking, empowerment and social justice, must claim a more active role in the field of environmental preservation (Dominelli, 2012).

At the same time, emerging technologies—especially Artificial Intelligence (AI)—are transforming how ecosystems are monitored and protected. This paper explores how social workers can engage with AI in environmental work through the lens of Ecological Systems Theory (EST) to ensure that technological innovation aligns with community needs and justice-based outcomes.

Theoretical Framework

Ecological Systems Theory

Human growth is conceptualized within five nested systems in Urie Bronfenbrenner's Ecological Systems Theory (1979):

Microsystem	:	Immediate surroundings, such as a family or neighborhood
Mesosystem	:	Relationships between microsystems, such as those between communities and schools

Exosystem : Indirect surroundings that have an impact on people (e.g., infrastructure, policy)

Macrosystem : Cultural values, ideologies and societal norms

Chronosystem : Temporal changes across the life course and history

While originally applied to human development, this systems-based model can also be repurposed to understand human - environment interactions, particularly how communities relate to, impact and are affected by environmental conditions.

AI in Environmental Monitoring and Conservation

AI is being used in several different ecological domains:

Image analysis and remote sensing : Keeping an eye on wildlife numbers, urban prawl, and deforestation

Predictive Modeling : Predicting the likelihood of species extinction, climatechange, and catastrophic disasters

Automation and Robotics : Managing protected areas or identifying invasive species

Data Integration Platforms : Synthesizing large datasets (e.g., from satellites, drones, citizen science) to inform environmental governance However, these technologies often lack a grounded socio-ecological framework, risking technological determinism and marginalizing local or Indigenous knowledge systems.

Synthesizing EST and AI Applications: A Systems-Based Model

This model highlights moral, community-focused applications and shows how AI can be incorporated with every level of EST:

EST Level	Ecological Focus	AI Contribution	Social Work Perspective
Microsystem	Human-animal interactions and local ecosystems	Smart sensors for monitoring wildlife, local water and air quality	Using participatory technology to empower communities
Mesosystem	Interagency cooperation between urban and rural areas	Hubs for integrated environmental data	Intersectoral environmental justice advocacy
Exosystem	Infrastructure and policy systems	AI driven early warning systems & Urban Planning	Fairness in access to green infrastructure
Macrosystem	Governance and Cultural values	NLP to monitor climate discourse and track policy impact	Ecological citizenship and Critical awareness

Chronosystem	Temporal trends of environmental change	AI for adaptive learning systems and long-term climate modeling,	Environmental justice across Generation

In addition to deploying AI, this paradigm encourages practitioners to integrate it into moral, context-aware frameworks that put social and environmental sustainability first.

Ethical Implications and Community Engagement

In order to promote fair and efficient environmental stewardship, an EST-informed use of AI places a strong emphasis on inclusiveness, transparency, and capacity building. It ensures that marginalized communities' opinions influence both the process and the results by involving them in data collecting and analysis. AI systems should be transparent, interpretable and linked with local values to sustain confidence and relevance. To interact with and use AI tools on their own terms, communities need to be prepared. To guarantee that AI becomes a tool for community-driven environmental advocacy rather than a top-down imposition, social workers, engineers, and environmentalists must work closely together.

Recommendations

Interdisciplinary Curriculum	:	Teach systems thinking and AI literacy to social workers and environmental scientists.
Community-Based AI Pilots	:	Work with local people to test and create AI tools.
Policy Advocacy	:	Advocate for laws that regulate the moral application of AI in conservation.
Research Funding	:	Encourage initiatives that clearly connect AI to the welfare of people and the environment.

Conclusion

The potential of artificial intelligence to protect the environment is unparalleled. However, holistic frameworks that emphasize human-environment interactions, such as Ecological Systems Theory, must direct its implementation. We can promote more equitable and inclusive routes to ecological sustainability in addition to more intelligent conservation tactics by integrating AI technologies into a multi-level systems framework.

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