

FROM MARINE BIO-TRAUMA TO WEARABLE MEANING

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ABSTRACT

Marine plastic pollution causes extensive biological trauma to marine organisms, yet such suffering often remains visually distant and emotionally abstract to the public. Jewelry design, as a body-centered and symbolic medium, offers a unique pathway to translate ecological trauma into tangible and emotionally resonant forms. This study investigates how marine bio-trauma can be systematically transformed into wearable visual language through trauma-oriented eco-jewelry design. A mixed-methods approach was employed, integrating an audience perception survey (n = 220) with practice-based design research. Quantitative analysis examined public emotional responses, acceptance of trauma-themed jewelry, and preferences for design elements. Based on these findings, bio-trauma elements were extracted across three dimensions—color, structure, and symbolism—and translated into six jewelry prototypes using silver, resin, and cold enamel techniques. The results demonstrate that symbolic abstraction, moderated trauma intensity, and material credibility are critical for effective ecological communication through jewelry. This study proposes a trauma-oriented visual translation framework that contributes to sustainable design research by integrating empirical perception, symbolic coherence, and embodied craft practice.

Keywords: marine plastic pollution; bio-trauma; eco-jewelry; emotional design; practice-based research

INTRODUCTION

Marine plastic pollution has become one of the most pressing ecological crises worldwide. Beyond environmental contamination, plastic waste inflicts severe biological trauma on marine organisms, including entanglement, ingestion, deformation, and tissue necrosis. While scientific documentation of these impacts is extensive, their emotional and ethical significance often remains inaccessible to the public.

Design has increasingly been recognized as a mediator between environmental knowledge and public awareness. Jewelry design, in particular, operates at the intersection of body, symbolism, and emotion, allowing ecological narratives to be experienced physically rather than abstractly. However, many existing eco-jewelry practices prioritize material sustainability or decorative symbolism while avoiding direct engagement with biological suffering.

This study addresses this gap by exploring how marine bio-trauma can be translated into wearable visual language through trauma-oriented jewelry design. The research aims to empirically examine audience perception and to develop a systematic design framework that balances trauma expression, symbolism, and wearability.

METHODOLOGY

A mixed-methods research framework was adopted to ensure empirical grounding and design validity. The methodological logic follows a closed-loop model of **Perception** → **Translation** → **Design** → **Evaluation**.

2.1 Audience Perception Survey

An online questionnaire was distributed to individuals with interests in jewelry, design, or environmental issues. A total of 220 valid responses were collected. The questionnaire examined:

- Awareness of marine ecological crises
- Emotional responses to bio-trauma imagery
- Acceptance of trauma-themed jewelry
- Preferences for color, material, and representational style
- Perceived communicative potential of jewelry

Responses were measured using a 5-point Likert scale and analyzed through descriptive statistics and correlation analysis.

2.2 Practice-Based Design Research

Based on survey results, six marine organisms—fish, sea turtle, dolphin, jellyfish, starfish, and coral—were selected as representative cases for bio-trauma translation. Visual and structural trauma elements were extracted and transformed into jewelry prototypes through iterative design experimentation.

Silver was used as the primary structural material, combined with resin and cold enamel for color and texture. Handcraft techniques, including soldering, shaping, hollowing, and surface treatment, were employed to physically embody trauma characteristics.

RESULTS

3.1 Emotional Response to Marine Bio-Trauma

Survey data indicate a high level of emotional sensitivity to biological trauma. When presented with images of injured or polluted marine organisms, 90% of respondents reported strong negative emotions, including sadness, distress, and anger. This confirms that bio-trauma imagery is an effective emotional trigger for ecological concern.

3.2 Acceptance of Trauma-Themed Jewelry

While respondents generally accepted the integration of ecological themes into jewelry, explicit or graphic depictions of trauma led to discomfort and rejection. Abstract and symbolic representations were significantly more acceptable, empirically confirming a tension between trauma expression and wearability.

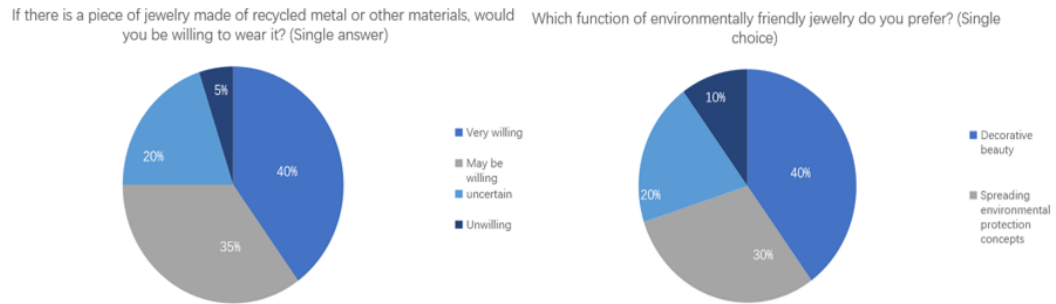


Figure 2 Environmentally friendly jewelry acceptance survey

Figure 1Research on Biological Trauma and Emotional Perception

3.3 Design Element Preferences

11. Which color of environmentally friendly jewelry do you find most acceptable? (Single choice)		
Options	Number of people	percentage
A.Blue (Ocean)	121	55.0%
B.Gray/black (pollution)	44	20.0%
C.Red (Warning)	33	15.0%
D.other	10	10.0%
Total number of people	208	—

12. What materials do you prefer your eco-friendly jewelry to be made of? (Multiple choices)		
Options	Number of people	percentage
A.Recycled plastics	99	45.0%
B.Recycled Metals	143	60.0%
C.natural materials	121	55.0%
D.other	11	5.0%
Total number of people	220	—

13. What is your preferred design expression? (Single choice)		
Options	Number of people	percentage
Realism	55	25.0%
abstract	88	40.0%
symbol	66	30.0%
uncertain	11	5.0%
Total number of people	220	—

Figure 3 Design element preference survey

Color preferences favored blue as a primary symbolic reference to marine environments, while gray and black were accepted as secondary indicators of pollution and destruction. Recycled metal and natural materials were preferred over recycled plastic, reflecting a demand for both sustainability and perceived material quality. Symbolic and abstract forms were favored over realism for communicating ecological trauma.

4. Bio-Trauma Visual Translation Framework

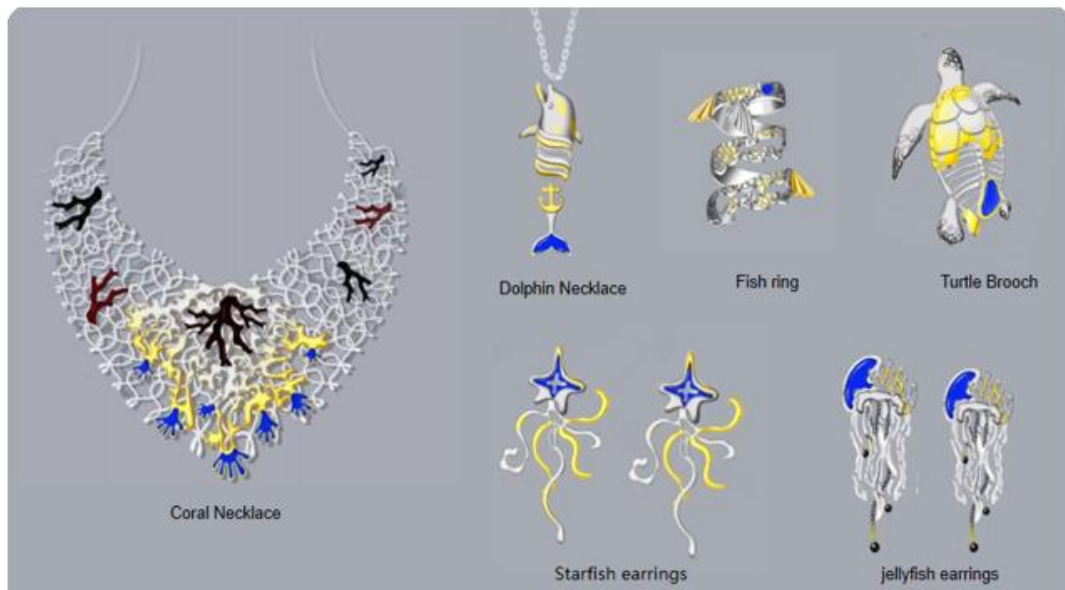


Figure 5 Design renderings



Figure 6 Product photos

Six jewelry prototypes were produced as a coherent series titled Blue Deep Ringing. The works form a narrative sequence from entanglement and struggle to damage and fragile hope. Material choice, craft process, and form collectively function as a closed symbolic system:

- Material operates as ecological metaphor

- Craft embodies trauma through physical intervention
- Form acts as a perceptual trigger for emotional reflection

Packaging and exhibition design were treated as evaluative environments rather than commercial presentation, allowing observation of communicative effectiveness and emotional resonance.

Discussion

The findings demonstrate that trauma-oriented eco-jewelry can function as an effective medium for ecological communication when guided by empirical audience perception. Symbolic abstraction enables trauma to remain emotionally impactful without overwhelming wearability, while craft processes reinforce ethical reflection through embodied making.

This research positions jewelry design not merely as decorative practice but as a form of materialized ecological narrative grounded in audience perception and ethical design principles.

CONCLUSION

This study proposes a trauma-oriented visual translation framework for eco-jewelry design that integrates empirical perception research with practice-based design methodology. By translating marine bio-trauma into wearable form, jewelry becomes a medium for embodied ecological communication.

The research contributes to sustainable design discourse by offering a replicable model for transforming ecological trauma into emotionally resonant and ethically grounded design language. Future studies may explore cross-cultural perception and long-term behavioral impact.

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