



NOVEL APPLICATIONS OF IMPACT ASSESSMENT FOR EMERGING/NEW TECHNOLOGIES AND ACTIVITIES CASE STUDY: THE OCEAN CLEANUP

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IAIA26



Fundamental Question



How do you conduct an impact assessment (IA) when:

- The environment is already profoundly human-altered?
- The activity is non-extractive and arguably restorative?
- No pristine baseline exists?



Why This Case Is Different



Where most environmental impact assessments (EIAs) assess projects expected to create net environmental pressure, The Ocean Cleanup (TOC) is working in a region where the contaminant itself has acquired ecological function

This results in an IA challenge beyond standard assumptions:

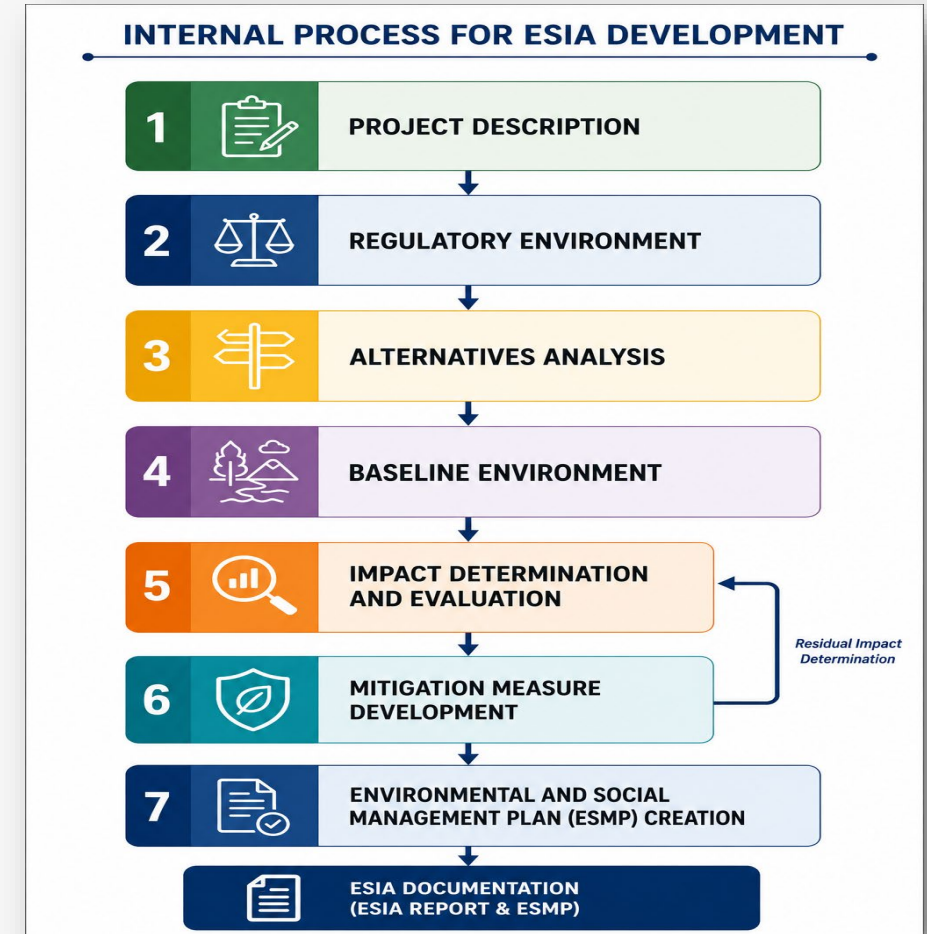
- Human-modified baseline ecosystem;
- Activity intended to remove legacy environmental impacts;
- Areas beyond national jurisdiction (ABNJ) setting with limited regulatory oversight; and
- Data poor, remote, deep-water environment.



What a “Typical” Offshore IA Looks Like



- Define project scope and identify impact-producing factors (IPFs)
- Quantification or use of proxy-based assumptions
- Regulatory environment summary
- Alternatives analysis (including No Action)
- Environmental/social baseline development and gap analysis
- Stakeholder engagement and consultation (project-specific)



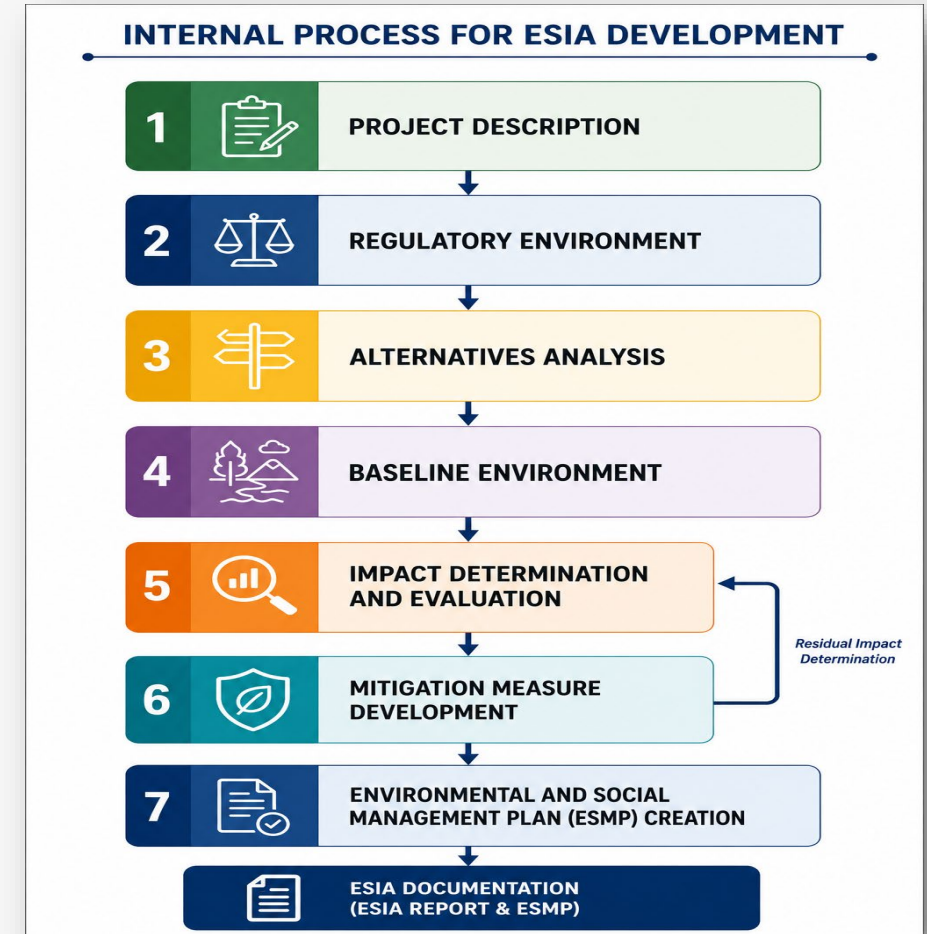
ESIA = environmental and social impact assessment



What a “Typical” Offshore IA Looks Like - Continued



- Project-specific IA methodologies (regulator-, client-, or Generally Internationally Accepted Industry Practice [GIIP]-driven)
- Impact assessment and application of the mitigation hierarchy
- Consideration of cumulative and transboundary impacts
- ESMP development

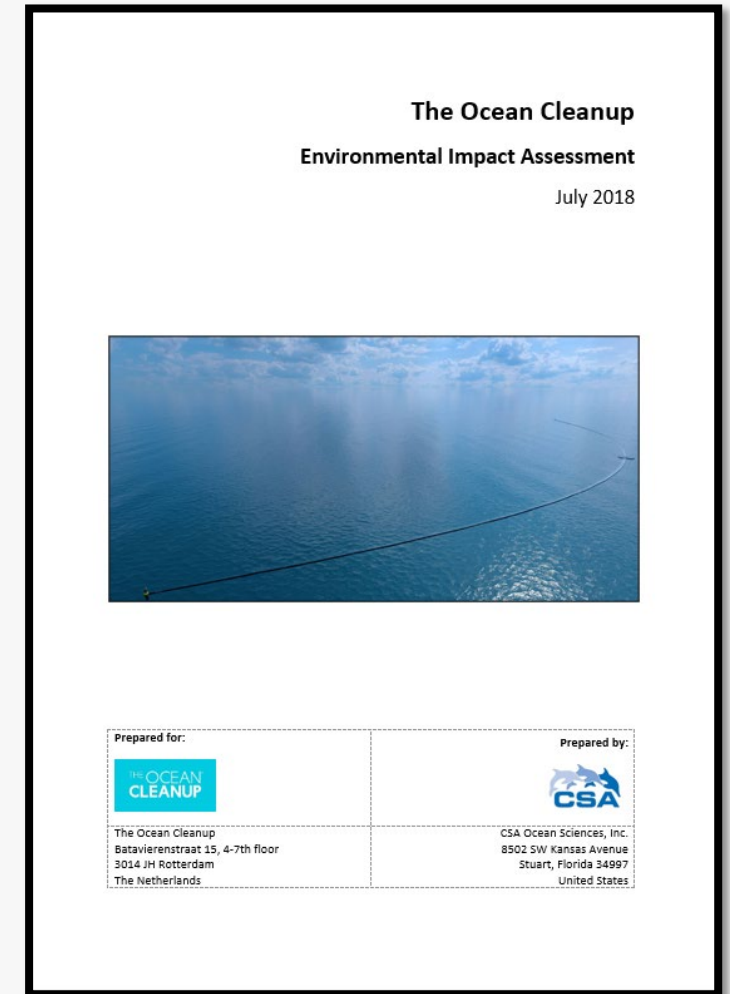




Case Study Introduction: A Unique IA Challenge



- CSA Ocean Sciences (CSA) engaged to develop an EIA (2017-2018)
- Novel Application of IA – **TOC**
- System evolution and scale-up required iterative EIAs (2018–2023) – evolving from a small-scale prototype to a full-scale system





The Ocean Cleanup: Technology Overview



- Netherlands-based non-profit organization
- Mission: remove 90% of floating ocean plastic pollution by 2040
- System 03: U-shaped floating barriers, vessel-towed
- Operations focused on the Great Pacific Garbage Patch (North Pacific Gyre)

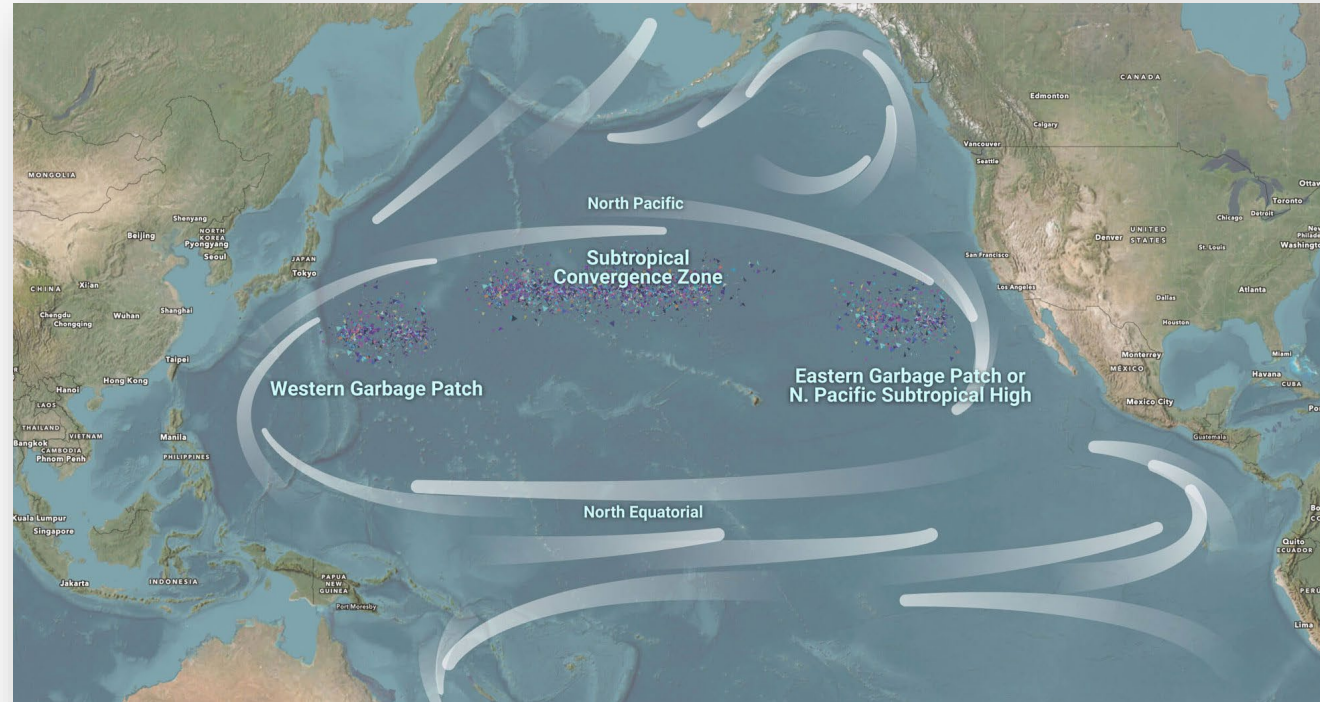




Project Setting and Governance Context



- Remote, deep-water ABNJ location
- Limited baseline ecological data
- No formal EIA mandate for non-extractive activities
- Outside ISA or conventional marine permitting regimes





Existing Environmental Condition: Floating Plastics



- Novel, human-created surface ecosystem
- Epibiotic and neustonic communities
- Refugia and localized biological aggregation
- Functional ecology in an otherwise oligotrophic environment





Impact Pathways: Removal vs. No Action



- Plastic removal may
 - Affect marine mammals, turtles, fishes, and neuston
- Plastic left in place may
 - Continue chemical leaching
 - Generate micro- and nanoplastics
 - Increase fouling and ingestion risks





Novel IA Issue: Trade Offs



- Artificial but functional ecosystem created by persistent human pollution
- Poorly studied, limited historical analogues

Central IA question

Do long-term benefits of plastic removal outweigh disruption of an artificial ecosystem?





IA Principles: What Still Applies



- Core IA principles remain valid
- Systematic impact identification
- Transparency and documentation
- Mitigation hierarchy
- Alternatives analysis
- Stakeholder engagement





IA Execution: What Required Adaptation



- Standard execution did not fully apply
- Limited/inadequate historical “reference” baseline
- Fragmented data and novel receptors
- Absence of formal regulatory authority
- Value-based stakeholder scrutiny
- Adapted scope, sequencing, and methods

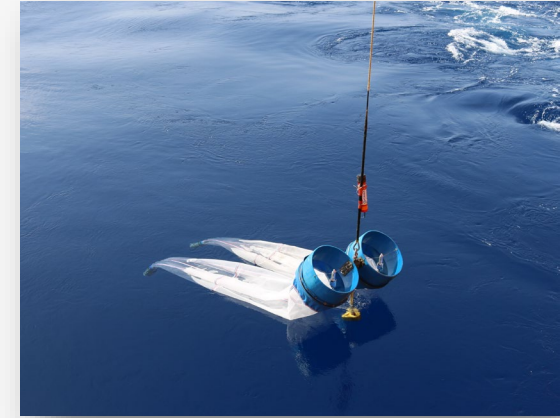




Adapted IA Approach



- Early, creative integration of IA into design
- Iterative feedback to technology development
- Targeted plankton and neuston surveys to address data gaps
- Monitoring driven adaptive management
- IA as a problem-solving tool, not just a compliance exercise





Key EIA Findings



- Baseline represents a human altered equilibrium
- Characterization focused on current function, not a historical state

Plastic removal may

- Reduce long-term contamination risks
- Disrupt an existing artificial ecosystem
- IA emphasis shifted to explicit trade-off evaluation



Broader Implications for IA Practice



The No Action alternative is not impact-free

- Ongoing fragmentation and contamination
- Increasing micro/nanoplastics over decadal scales
- Trade off analysis and uncertainty management are central to credible decisions
- Early application of IA improves both decisions and outcomes



Conclusions



- Novel technologies demand flexible, adaptive IA
- Innovation does not invalidate IA—it tests it
- IA must evolve with emerging activities and societal expectations



<https://theoceancleanup.com/updates/environmental-impact-assessment-available/>

Final Thought

Novel applications
of IA are not a
departure from
good practice –
but its natural
evolution





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Thank you!



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