for improving seaweed aquaculture techniques and management precision. In parallel, nanosensors and related monitoring tools are being proposed for water-quality surveillance, disease detection, and biofouling control, suggesting that future green *Porphyra* models will increasingly rely on real-time sensing and early-warning capacity rather than periodic manual observation alone.

The high-quality development of the *Porphyra* industry will require moving from farm-level greening to whole-industry coordination across governance, markets, and value chains. Global aquaculture assessments emphasize that sustainable growth depends on stronger governance, regulatory frameworks, social responsibility, and greater investment in research and development, while China's green-aquaculture framework likewise defines green development as the joint achievement of environmental friendliness, technical efficiency, product safety, income growth, and consumer satisfaction. This means that the future of the nori industry should not be judged only by production expansion, but by whether ecological, economic, and product-quality goals are advanced together.

A second pathway is to build a more diversified and resilient blue-economy structure around *Porphyra* biomass. Recent reviews indicate that *Porphyra* has expanding potential in food, pharmaceuticals, nutraceuticals, and biofuel applications, while broader seaweed outlooks argue that scaling seaweed aquaculture is essential for food security and sustainability under future resource constraints. In this sense, the long-term outlook for green *Porphyra* farming is strongest when the industry links high-standard cultivation with value-added processing, ecosystem-service recognition, and low-carbon development pathways.

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