

# THE ECONOMICS OF MARINE BIOTECHNOLOGY: THE GOLDEN TRIANGLE OF BLUE GROWTH

Bunei Nishimura, Denis Bailly and Pascal Le Floc'H

Université de Brest, UMR AMURE - Centre de droit et d'économie de la mer, IUEM, 12 rue du Kergoat, CS 93837, 29238 Brest Cedex 3, France  
E-mail: [bunei.nishimura@univ-brest.fr](mailto:bunei.nishimura@univ-brest.fr)

Many marine resources could be used by marine biotechnology in order to be transformed into food, medicine, cosmetics and energy. The marine biotechnology is not restricted at creating new industrial products; it could also contribute to the bio-economy and grand societal challenges. The golden triangle of blue growth (marine resources, demand and market development, product and innovation) shows that marine biotechnology has a high potential in strengthening the regional economic development and in allowing a more sustainable use of marine resources. However, many problems exist in the process of marine resource uptake (availabilities, transportation costs, marketing conditions). The present work relates two case studies of regional development focusing on algae and co-products of fisheries and aquaculture in Brittany (France) and Tohoku (Japan). This study aims to: 1) identify opportunities and constraints for the development of marine biotechnology using Value Chain Analyses; and 2) identify public-private partnerships in the areas of research and innovation and market development (poles, clusters). Constraints and opportunities are based on the organisation of the sector and the links with the regional economy. The golden triangle of blue growth will be examined to a regional level rising questions as: Is the regional marine food industry adapted to a better use of living marine resources? What are the main barriers to a regional level for an efficient organisation of the marine biotechnology industry? Public-private partnerships have to improve technology transfer pathways by strengthening the basis for proactive interaction between academic research and industry. What is 'the state of art' on marine biotechnology and is there a technological transfer between academic research and the industry on a regional basis?