Abstract— The goal of UTOFIA (EU project number 633098) is to offer a compact and cost-effective underwater imaging system for turbid environments. Using range-gated imaging, the system will extend the imaging range by factor 2 to 3 over conventional imaging systems, while at the same time providing video-rate 3D information. This will fill the current gap between short-range, high-resolution conventional video and long-range low-resolution sonar systems. UTOFIA offers a new modus operandi for the main targeted domains of application: marine life monitoring, harbour and ocean litter detection, fisheries stock assessment, aquaculture monitoring, and seabed mapping. A novel, frequency doubled laser system emitting at 532nm to be used as scene illuminator is the main result of this presentation. The laser is based on a completely new conceptual design necessary to meet the tougher laser specifications as emerged after the successful results obtained with a preliminary off-the-shelf source (System-Zero implementation) and the prospected requirements for enhancing UTOFIA imaging system competitiveness. The new laser presents a novel MOPA (master oscillator-power amplifiers) architecture, chosen in order to render the output energy scalable in the present and future upgrades. The energy, pulse duration, and repetition rate goals sought for this item have been achieved: >2mJ at 532nm, <2ns, up to 1kHz. Other issues have been addressed and successfully managed with this new laser implementation: very compact packaging, low power consumption, and efficient cooling under a wide range of operating environmental conditions. Two more features, important for optimal imaging operation of the system, are the ability of the laser to operate in low temporal jitter when triggered by the video-camera signals in order to meet with the correct range-gating temporization and a refined optical beaming that allows a versatile control of the scene illumination over a wider range of distances and angular span.