

A new approach to define the ecological status of North Adriatic hard substrate benthic communities of rocky outcrops

Emiliano Molin & Berton Andrea

Thetis s.p.a Castello 2737/f, 30122 Venice, Italy

Corresponding author: emiliano.molin@thetis.it

Keywords: northern Adriatic Sea, benthic communities, ascidians, porifera, image analysis, biomass estimate

The North Adriatic Sea is characterized by the presence of some rocky outcrops, locally called “tegnùe”. These areas have a very important ecological role in the Northern Adriatic Sea and some of them are protected by regional law and other are in way to begin that.

The research on benthic communities of these areas had been intensified in the last ten year (Gabriele *et al.* 1997, 1999; Mizzan 2000; Molin *et al.* 2003; Soresi *et al.* 2004; Ponti & Mastrototaro 2006; Ponti *et al.* 2006). Some of these studies confirm the important role in terms of biomass of the filter feeder's group in particular Porifera and Ascidiacea groups. For example these taxa differ in abundance in relation with: the turbidity of water column; the sedimentation rates and the capability of the organisms to cope with these kinds of stresses (Narajo *et al.* 1996; Gabriele *et al.* 1999; Molin *et al.* 2003; Ponti & Mastrototaro 2006). In different way these authors find relations between the abundance of some species (*Polycitor adriaticus*, *Aplidium conicum*, *Styela plicata*, *Chondrosia reniformis*) and the distance from the coast and describe the potential relation between the water turbidity, sedimentation rates and the distribution of some Ascidiacea and Porifera. Some of these observations are confirmed by the results of The Project of the Veneto Region called “Tegnùe dell'Alto Adriatico. Valorizzazione della risorsa marina attraverso lo studio di aree di pregio ambientale” (ARPAV 2007), where is possible to observe an increase of Ascidian and Porifera biomass in area characterized by lower level of turbidity. These kinds of studies, however, are very demanding and need a lot of work on field. The aim of this work is to offer a low impact, economical and fast technique, in alternative to classical method to define benthic communities status.

During the summer 2007 were done same photographic samples, using a frame to get the right orientation of the camera with the substrate, of some species of megabenthic communities (Gage & Tyler 1991) that a lot of authors define as good descriptor of the status of benthic communities.

Some specimens or colony photographed were collected in three natural rocky outcrops and in one artificial reef; for each species were collected some photo of single colony or individual. From the photographic samples were calculated the cover surface for each colony or individuals of the species through the software Autocad 2.01. The specimens and the colonies photographed and collected were determinate; wet and dry weight and ash free dry weight were calculated for each one.

The correlation equations of cover surface vs wet weight, of wet weight vs dry weight, of dry weight vs ash free dry weight were used to calculate the biomass' value from the cover surface of some scrapping sample preventively photographed during the experimental activities on outcrops (ARPAV 2007). We compared the biomass

calculated using the “photographic method” with the biomass values from scraping (Tab. 1).

In term of biomass estimated by “photographic sample” and scraping sample the results are comparable, the accuracy could be improved, increasing the specie-specified conversion curves dataset.

Another weak point of “photographic sample” is that the error increases when the shape of benthic communities is not flat but it shows a lot of elevations. In fact it uses a photo (two-dimensional) to calculate a volume, losing the information on height, so it needs a particular attention on experimental design and a stratified sampling strategy is suggested.

Otherwise this method is economical, fast, easy to run, with a low impact and could be an useful tool in monitoring program of benthic communities in protected area or for ecological studies.

In our case the presence of key species of Ascidiacea and Porifera distributed in function of some environmental parameter could be used like “early warning” to mark environmental changes related to anthropic activity or natural changes.

Table 1 - Comparison of biomass estimation calculated by “photographic method” and “scraping method” obtained from experimental activities on outcrops (ARPAV 2007).

SPECIES	DW by photo	DW by scraping	[Difference]	% error
<i>Haliclona sp</i>	56.8	52.1	4.7	9.1
	402.5	447.0	44.5	10.0
	228.8	270.0	41.2	15.3
average				11.4
standard deviation				3.3
n				3
<i>Tethya sp</i>	15.0	18.5	3.5	19.0
	153.3	182.0	28.8	15.8
	24.0	31.6	7.6	23.9
average				19.6
standard deviation				4.1
n				3
Chondrillidae	478.2	403	75.2	18.7
	111.9	120.7	8.8	7.3
	439.0	377.9	62.0	16.5
average				14.1
standard deviation				6.0
n				3

References

ARPAV, 2007. *L'Alto Adriatico: azioni, collaborazioni e integrazione scientifica per la valorizzazione della risorsa mare*. Convegno finale del Progetto INTERREG III. Venezia 12 e 13 Aprile 2007.

Gabriele M., Putrone V., Brunetti R., 1997. Morphometrics and energetic value of Adriatic ascidians. *Cah.Biol.Mar.* 38: 169-174.

Gabriele M., Bellot A., Gallotti D. & Brunetti R., 1999. Sublittoral hard substrate communities of the northern Adriatic Sea. *Cah. Biol. Mar.* 40: 65-76.

Gage J.D. & Tyler P.A., 1991. *Deep sea biology: a natural history of organisms at the deep sea floor*. Cambridge University Press, Cambridge.

Mizzan L., 2000. Localizzazione e caratterizzazione di affioramenti rocciosi delle coste veneziane: primi risultati di un progetto di indagine. *Bollettino del Museo Civico di Storia Naturale di Venezia* (50): 195-212.

Molin E., Gabriele M., Brunetti R., 2003. Further news on hard substrate communities of the northern Adriatic sea with data on growth and reproduction in *Polycitor adriaticus* (von Drasche, 1883). *Boll. Mus. Civ. Nat. Ve.* 54: 19-28.

Narajo S.A., Carballo J.L. & García Gómez J.C., 1996. Effects of environmental stress on ascidian populations in Algeciras Bay (Southern Spain). Possible marine bioindicators ? *Mar. Ecol. Prog. Ser.* 144: 119-131.

Ponti M. & Mastrototaro F., 2006. Distribuzione dei popolamenti ad ascidie sui fondali rocciosi (Tegnùe) al largo di Chioggia (Venezia). *Biologia Marina Mediterranea* 13 (1): 621-624

Ponti M., Tumedei M., Colosio F. & Abbiati M., 2006. Distribuzione dei popolamenti epibentonici sui fondali rocciosi (Tegnùe) al largo di Chioggia (Venezia). *Biologia Marina Mediterranea* 13 (1): 625-628.

Soresi S., Cristofoli A., Masiero L. & Casellato S., 2004. Benthic communities of rocky outcrops in the northern Adriatic Sea: a quantitative survey. In: *Rapport du 37e Congrès de la Commission Internationale pour l'Exploration Scientifique de la mer Méditerranée*. 7-11 june 2004-Barcelona : 331.