CONSERVATION AND CONFLICT RESOLUTION IN TRANSBOUNDARY PROTECTED AREAS: PRESPA AS AN EUROPEAN CASE-STUDY

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Abstract: *Transboundary protected areas* have a primary role of conserving bio-diversity and natural ecological processes protected areas in sensitive areas. However in addition to serving the nature conservation, transboundary protected areas are widely held to offer a major contribution to managing and resolving political divisions via establishing links and building trust and co-operation between individuals and communities in addressing common social and economic needs. Lake Prespa and the Desaret lake region provide an opportunity both to test and apply these ideas. The common aims and objectives for the area should be eventually articulated in a management plan, which covers not just species and ecosystem conservation, but also socio-economic objectives and mutually supportive co-existence of nations and minorities. The main players in this process will be *'epistemic communities'* – conservation managers, academic researchers, local community representatives – all with appropriate institutional links at national and international level. Progress has already begun: the academic communities in Albania, Greece and Macedonia are already working towards this goal through a *first Albano-Greko-Macedonian cross-boundary consensus* as a basis for lasting co-operation between local peoples and their governments in the area. Prespa and the Desaret natural system are to take its place within an European Ecological Network as one of the key 'ecological bricks' of our common European Heritage. *Copyright ©2000 IFAC*

Keywords: Ecological stability; non-linear Kalman filter; transboundary protected areas; conservation management; conflict management; regional co-operation.

1. INTRODUCTION: A NATURAL ECOSYSTEM FRAMEWORK FOR ANALYSIS

"I think it is in Macedon where Alexander is born. I tell you, captain, if you look in the maps of the 'orld, I warrant you at shall find, in the comparisons between Macedon and Monmouth, that the situations, look you, is both alike. There a river in Macedon; and there is also, moreover, a river Monmouth: It is called Wye at Monmouth; but it is out of my prains what is the name of the other river; but 'tis all one, 'tis alike as my fingers is to my fingers, and there is salmons in both".

(Fluellen, in William Shakespeare's ***King Henry the Fifth***

William Shakespeare's fiery Welsh army captain at the time of the battle of Agincourt, almost six centuries ago, could see no difference between Macedonia and Monmouth (in Wales). Both, he said, had rivers

(though he couldn't remember the name of Macedonia's 'river') and both rivers had salmon. For him, nature and people were the same the world over; conflict and war were inevitable, necessary, and universal. Today we think differently. The very concept of bio-diversity emphasises variety and difference. The value of the world's cultural heritage is that it is locally based and highly diverse. If social progress means anything, it must include acknowledging our obligation to protect our highly diverse natural and cultural heritage; for ever, and for everyone. 'Conservation is about negotiating the transition from past to future in such a way as to secure the transfer of maximum significance' (Holland and Rawles 1993). Defined thus, biological and cultural conservation are complementary, and hence conservation and conflict are opposites. Progress in conservation means progress in conflict amelioration, management and eventually resolution through common concern for the most critical problem of contemporary society – the protection of the planet on which we live.

2. NATURAL HABITAT: RESOURCE, PEOPLE AND THE OVERALL SYSTEM

Protected areas are central to conservation. If national parks and conservation sites have any value it must be to manifest our common responsibility to protect the locally precious and to maintain diversity, both biological and cultural. That is a mission, which transcends national barriers. Transboundary protected areas in particular have a special role in this process (Clarke, 1997b). They are widely held to offer a major contribution to the resolution of political divisions, in establishing links and building trust and co-operation between individuals and communities. This is in addition to the primary role of protected areas in conserving bio-diversity and ecological processes.

The 1992 Caracas conference (IUCN and McNeely 1993) and the many policy papers and analyses which have appeared since (see, e.g. IUCN and Commission on National Parks and Protected Areas 1994b) have affirmed a widely accepted (though often implicit) framework for the analysis of protected areas and for the elaboration of policy for their conservation; analysis and management of the *resource*, for *people* within the *system* (see Figure 1).

2.1. Conceptualisation of the Wider Overall System

The **resource** (physical and biological) is necessarily the *focus* of conservation. **People** are the *reasons* for conservation. People, of course, include the users of the resource, most importantly local residents as well as visitors. Particularly in the case of outstanding natural and cultural areas such as the area of *Desaret lakes* (Dimirovski, 1989; Clarke, 1997), which are part of our common European heritage, 'people' must also include future generations, for whom we hold such treasures in trust. The ***overall system***, natural, political, social and economic, provides the *context* for conservation. The IUCN itself identifies the key functions of protected areas as being to:

- Protect and enhance bio-diversity at the gene, species and community level
- Maintain ecosystems and ecological processes
- Protect valued natural and cultural landscapes
- Shelter indigenous communities and sustain traditional cultures
- Provide for society's scientific, educational, recreational and spiritual needs
- Benefit local and national economies
- Provide models for sustainable development elsewhere (IUCN and Commission on National Parks and Protected Areas 1994 a, b).

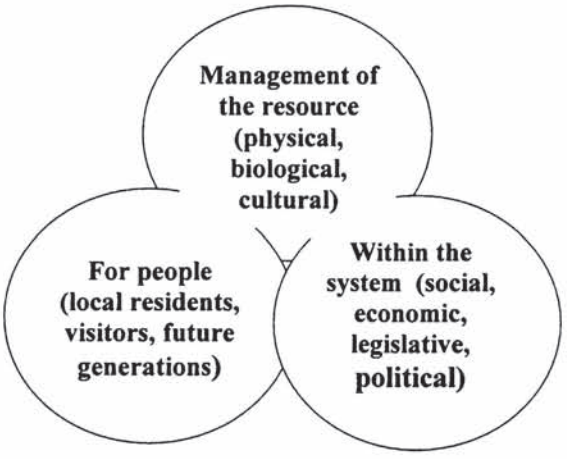


Fig. 1. Resource, people and the overall system in the framework of ecological considerations

Transboundary protected areas in particular have a special role to play in all these respects (Carroll 1988; Langer 1990; Westing 1992a, b). Because they straddle national boundaries, their role becomes not merely of national but of international significance. The number of transboundary areas in the Balkan region is large and, subsequent to the break-up of Yugoslavia it has become even larger. There is general recognition that even in early post-conflict conditions, such areas have a significant role to play in mediation and conflict resolution (Brunner 1998).

2.2. Aqua-Ecosystem and Bio-Diversity Protection

In respect of the resource, the Desaret group of tectonic lakes represents one of the worlds most most important transboundary ecological systems.

The Desaret system includes lakes Ohridean (shared between Macedonia and Albania), Little/ Vogel (Al)/ Mikri (Gr)/ Mala (Mk) Prespa or Prespa Minor (shared between Greece and Albania) and Big/ Madh (Al) / Megali (Gr)/ Golema (Mk) Prespa (shared between all three states). The lakes originated 2-4 million years ago in a geotectonic depression in the western Dinarics (Civjic, 1911) and are known as Desaret Lakes. As such these lakes are highly unusual not merely on a European but on a world scale, and are to be compared with lakes such as Baikal and Tanganyika. They are marked by an extraordinary biological diversity, a high degree of endemism, highly complex hydrogeological processes, all to a large degree still relatively uncompromised by human activity (Dimirovski, 1989; Sibinovic, 1987).

A major milestone conference in understanding and management of the Desaret system was held in Korce, Albania, in October 1997 (Gjiknuri and Grupche 1998). This included a large number of high quality contributions particularly on biological phenomena and on hydrological processes from both Albania and Macedonia; regrettably, the Greek side was not able to be present at the conference itself although there had been significant collaboration in its preparation.. This year in June 2000, in Oteshevo on Macedonian side of Prespanean Lake, a follow up to the 1997 Korca Conference was organised under joint leadership of Professors Ljupco Grupce (Skopje, MK), Leke Gjiknuri (Tirana, AL) and Mytro Pirovetsi (Thesaloniki, GR). This important second initiative succeeded in transcending regional political boundaries by focusing on common scientific concerns, which transcended historical memories, and the realities of recent hardships and conflicts. Well before the 1997 Conference however, the Desaret system has been a focus of international attention for its special features. Prespa is recognised as one of Europe's 24 major transboundary 'ecological bricks' (Langer 1990; European Community 1992).

On the Greek side, Mikri Prespa, for some years designated as a National Park, is also a Ramsar site, a Special Protection Area under the EC Birds Directive (79/409/EEC), a candidate Special Area of Conservation under the EU Habitats Directive (92/43/EEC). Despite such a plethora of designations, Mikri Prespa, like Megali Prespa, suffers from many problems (not least a lack of staffing, resources and effective legislative protection, in addition to ecological problems, some of which derive from its transboundary status) which are common to other parts of the region. As a Natura 2000 site Mikri Prespa is a core area of the European Ecological Network (EECONET, see Bennett, 1991; Bennett, 1994; Clarke and di Friedburg, 1996; Clarke, 1997 a,b).

On the Macedonian side, Ohridean Lake and Golema Prespa, plus the Galicica and Pelister National Parks together with a number of nature reserves, and town of Ohrid itself (Kolemisevska, 1998), form the basis for a major transboundary protected area system. A thorough system theory based study and modelling of the water dynamics of the Prespa-Ohridean aqua-ecosystem has been already conducted and the findings reported (Kolemisevska and Dimirovski, 1997; Dimirovski and Kolemisevska, 1997; Kolemisevska and co-authors 1999). In addition, a similar thorough hydrology study was also conducted and reported in (Cavkalovski, 1997). The issues and problems of sustainable regional development with environment conservation have been reported in Grupce (2000).

On the Albanian side, also a great deal of research studies have been carried out on various bio-diversity issues, particularly on Vogel and Madh Prespa (Gjiknuri, and co-authors 1997; Kapidani and Gambeta, 1997). In addition, Albanian scientists from their side also investigated the hydrological issues for Korce region at large and Prespa Minor in particular (Pano and co-authors, 1997, 2000; Kanari, and co-authors, 1997).

International interest in the area is not limited to formal designations. For some years, London University was itself closely involved with the Greek National Park Agency in a World Wildlife Fund funded project to produce a monitoring strategy for Mikri Prespa (Goldsmith 1990). Students from the University College Master's programme in Conservation have used the area on a number of occasions as a base for field based training in management planning and monitoring. This led to the production of the first draft management plan for the Greek side of the area. It is possible that the involvement of external academic institutions, which would make monitoring a truly international exercise, could facilitate the tripartite interchange, which is such an essential basis for the long term future of the area.

Indeed these academic initiatives and activities for the purpose of common ecological concerns open an innovated means of cross-boundary conflict management and, hopefully, resolution in long run. The example case that is investigated in this paper of academic has materialised through the open minded ideas and enthusiastic endeavours of the three academic communities around preserving Prespa region of common concern through scientifically grounded co-operation of the neighbouring countries in long lasting confrontation. In particular, their recent history has demonstrated severe confronting and conflict behaviours on various occasions during this century.

3. PRESPANEAN LAKE AQUA-ECOLOGICAL SUBSYSTEM DYNAMICS: THE HEART OF PRESPA TRANSBOUNDARY PROTECTED AREA

The simulation model development departs from the system-theoretic point of view on the hydrologic cycle in the basin natural lakes and reservoirs, in general. This contribution and its software implementation appear to be widely applicable due to the model construction via state equation modelling of the unmeasurable segment of hydrologic cycle (see Fig. 2) from precipitation to evaporation and the observable output water balance equation. The investigation of water level dynamical behaviour of Prespanean Lake is one application only. A special feature of this simulation technique for lake water dynamics is that it employs state estimation via the theory of non-linear extended Kalman filter, including the construction of a stable non-linear Kalman filter (Kolemisevska, 1998).

System theoretical, mathematical modelling and computational aspects of the theoretic derivation of this aquatic system model have been published elsewhere and details are found in Dimirovski (1989), Kolemisevska and Dimirovski (1997), and Kolemisevska and co-authors (1999). For the purpose of this paper we point out potential for investigating the behavour of natural lakes within co-operative studies for managing the cross-baundary sustainable development.

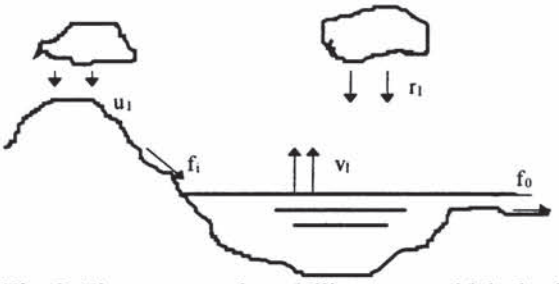


Fig. 2. The conceptual modelling a natural lake basin.

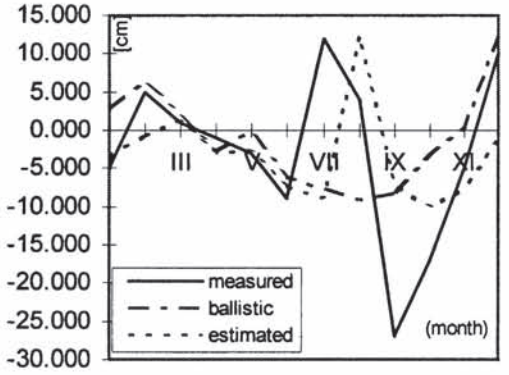
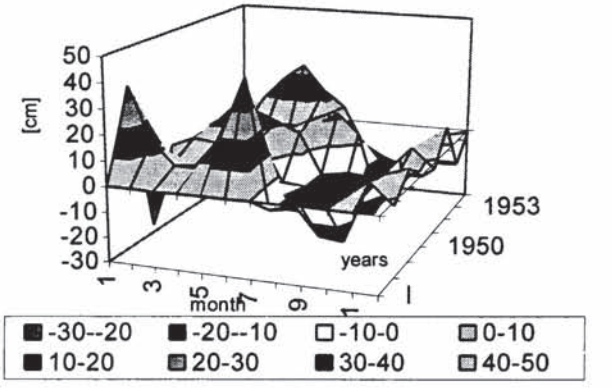
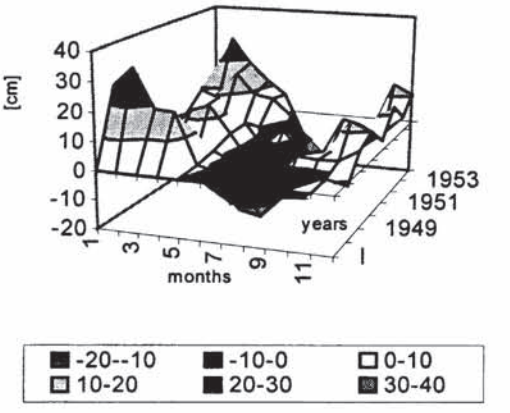


Fig.3 Measured, ballistic and estimated values y

Only a small subset of results that came out of extensive investigations on the respective water level dynamics of both Ohridean and Prespanean Lakes for various periods during this century when various human activities and respective anthropogenic load on the environment have taken place only illustrate this potential for understanding and predicting behavioural changes of aquatic ecosystems. Figures 3 and 4 a, b, c reconstructed Prespa Lake behaviour for the period 1946-1954 in a rather tangible way via time incremental surfaces of its water level dynamics.





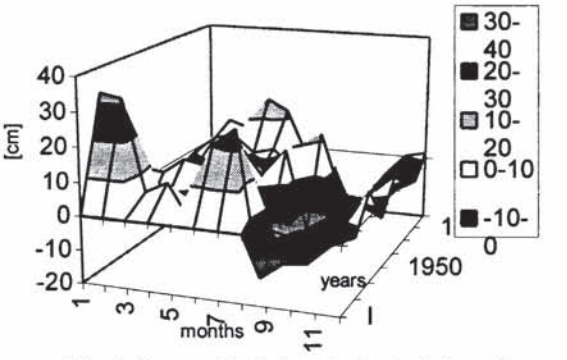


Fig. 4. Measured, ballistic and estimated values of variations of lake level

4. OVERALL SYSTEM AND PEOPLE: SYSTEMS APPROACH FOR NO SYSTEM BOUNDARIES

It is now widely accepted that protected areas will fail – in their primary role of bio-diversity and environment protection as well as in their secondary functions - unless they recognise the needs and secure the active participation of local residents and authorities (see, e.g. Pimbert and Pretty 1995). In the case of such transboundary areas, however, high authorities of the states sharing the area, e.g. as is the case of Prespa watershed and surrounding region, have to be brought in. For, as seen from the far - from a satellite taken scan-photo (see Fig. 5) - the nature globally does not recognise political frontiers (Dimirovski, 1999; Kile, 2000). Also, despite not recognising such frontiers, it reveals that wrong human induced activities which can devastate aqua-ecological systems (see Fig. 6) to extent to affect the neighbours as well and cause conflicting situation.

Fig. 5. Satellite scan of Ohridean (left) and Prespa-nean Macro and Minor (right) Lakes: no borders, but fluvial degradation of Prespa Minor bay (the little 'horn' at bottom-right corner) clearly revealed (Dimirovski, 1999).

There has been little work on public attitudes to environmental conservation in the region, and yet alone on the authorities at state level. Nevertheless, academic communities are trying to do their best, and one recent Greek study involved personal interviews of 337 farmers operating either in wetland areas (Little Prespa and Kerkini, another Ramsar site) and in a plain area. It found that compared to plains farmers, those in the Little Prespa basin wetlands practised more intensive crop and stock agriculture, had a more negative attitude to wetland resources and were more ignorant of conservation issues and the environmental impact of their activities. Overall willingness to adopt environmentally friendly farming practices was very low (Pyrovetsi and Daoutopoulos 1997). However, the existing involvement of local communities and NGOs in all three of the Desaret state regions provides a strong basis for a sustainable complex system (Zadech, 1973) which begins to meet local socio-economic needs as well as environmental protection.

A vital element in the success of a transboundary protected area in delivering social (as well as environmental) goods is its ability to attract visitors. Ohrid was (prior to 1991) a major focus of tourism, and the basis exists for a revival. However, recovery is likely to demonstrate very different models and demographic characteristics. The attraction of the area for domestic holiday-makers within each of the three national territories is already growing. Significant foreign currency earnings, however, depend on the attraction of long-stay tourists from further afield. In the case of Ohrid (for example) this must be based not merely on the historical significance of the town but on 'selling' it together with the attractions of the surrounding natural landscape (particularly of Pelister and Galicica) and its archaeological and cultural heritage. Planning is vital, both to secure a revival of tourism in the area and also to ensure that tourism does not further accelerate the degradation of the very resources that visitors come to enjoy.

Cross- frontier studies to examine not just attitudes but also perceived financial and other problems faced by farmers and other local residents in the three Prespa region states, would be of more than merely academic interest. They could yield information of very real value to the elaboration of practical solutions to local problems. It is important that the knowledge base is established and local consensus achieved before solutions are imposed. Clumsy attempts to impose environmental protection directed by the outcome criteria used by external funding agencies but which lack the consent and active involvement of the local community could exacerbate local problems.

5. AQUA-ECOSYSTEM CONCERNS: COMMON BASIS FOR SUSTAINABLE DEVELOPMENT

Until recent times, generically, the Prespa valley was characterised by its independent watershed, i.e. the *source area* for the natural Prespanean Lake, when Devolli River was diverted into Prespa Micro on

Albanian side 25 years ago. The valley is fairly isolated, its height ranging from 850 to 900m., surrounded by high mountains and having a own authentic climate. Naturally, it is characterised by certain specific geo-chemical circulation processes of bio-generic matter that have enabled the long developmental evolution of the Macro and Micro Prespa Lakes without outside distraction to its *underlying chemistry.* Considerable anthropogenic

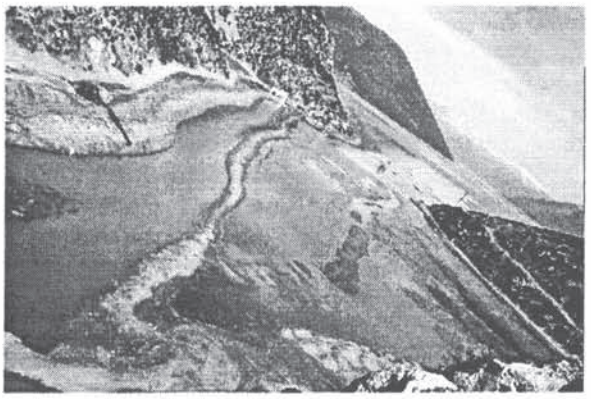


Fig. 6. Present view on the alluvium filled area on Albanian side of Micro Prespa Lake due to diverted Devolli River into the lake (Pano and co-authors, 2000; note the 'horn' at bottom-right corner in Fig. 5)

pressure in the valley appeared to be acting after the WW2 on Greek and Macedonian side of the lakes (Pirovetsi and Gerakis, 1987; Sibinovic, 1987) and much later on Albanian side through dramatic Devolli River impact (Kanari and co-authors, 1997; Pano and co-authors, 1997, 2000).

The anthropogenic pressure on Greek and Macedonian sides take place through the ever growing exploitation of natural resources in Prespa valley and the development of: advanced agricultural production, the exploitation of lake water for irrigation, water supply to neighbouring settlements and steadily expanding tourism, all resulting in increasing amount of industrial and communal waste water that *leeks* into the lake. These activities have generated pollution in the region that lead to increased phosphorus (Pomeroy, 1960) leaching into the lake that is responsible for its eutrophication, which in turn accelerates its geologic ageing process. The anthropogenic pressure on Albanian side (Pano and co-authors, 1997, 2000) ook place by and large since Devolli River was deviated from its natural flow and begun pouring muddy water to Micro Prespa Lake, while in summer the clean water of Micro Prespa is taken to fields in Korca valley for irrigation purposes, thus gradually transforming the former into a muddy swamp. Devolli river waters, which are one of the most turbid rivers of the Balkans, upon flowing in Micro Prespa Lake, decant in it rather quickly, which my be seen from the present of the bay after 25 years only where Devolli is diverted into. An alternative future can be enhanced by jointly developed and strictly implemented common strategy for sustainable development (Grupce, 2000) by the neighbouring communities and states.

5. CONCLUSIONS

Transboundary protected areas are of their essence often more difficult to establish than those whose boundaries are drawn within the confines of the nation-state. However, system science and its application to ecological systems, in general, and the aquatic ones, in particular, has clearly demonstrated there can be no boundaries within any kind of systems that are essentially induced by Nature. Perhaps the billions of years old Prespa-Ohridean watershed region, shared by three neighbouring countries of long confronted nations is the most representative example.

Nowadays in this region, success is contingent on the achievement of objectives such as the development of academic and scientific links, collaboration between NGOs, the establishment of good contacts and mutual trust between local communities, agreement on the need to harmonise management policies and at least some congruence in national legislation, that already exist within national boundaries. However if the difficulties are greater, so are the commensurate rewards In the long term, political stability and environmental protection as well as tourism and the local economy will be considerably enhanced if the Desaret system can be considered as a whole. Understanding the hydrological cycle of its lakes and, moreover, the longer-term dynamical cycle of Prespanean and Ohridean Lakes is rather essential for a proper conservation management approach. Also, zoning is essential, so that sensitive or fragile areas may be highly protected and development encouraged only where it can be integrated into a planned and sustainable system.

Transboundary protected areas also have the potential to attract external donor assistance and although experience in other areas shows that this is often well below what is needed (or expected) it can have a catalytic role. Some of the elements are already in place. The establishment of the 2,000 ha Ezerani reserve must be counted a major success and a tribute to the initiative of the Resen municipality, the activities of local conservation NGOs and to the good working partnerships that have been established.

The new sewage collection and treatment systems currently being installed on the Macedonian side of Ohridean and Prespanean Lakes should make a major contribution to water quality. Such *ad hoc* protection of sensitive areas can stimulate others, becoming part of a 'virtuous circle' of environmental improvement.

Integration is critical. First, the Desaret lakes and their catchment be treated as a whole, as a coherent ecological system essentially dependent on its aqua-ecological Prespa-Ohridean Lake sub-system (Figs. 4, 5). IUCN guidelines identify six essential stages for conservation planning in rural areas: conception, promotion, formulation, inception, implementation and evaluation (IUCN 1995). In practice of course the process is rarely so tidy, sequential and linear; uncertainty and repeated iteration are characteristic, particularly in complex situations such as Prespa. The 1997 Korce and 2000 Oteshevo conferences signalled that the project to develop Prespa as a transboundary protected area system has moved well into the 'promotion' and 'formulation' stage of the process.

Protected areas do not exist in isolation, but they are part of wider ecological systems. One of the most significant deficiencies of the whole European protected area system as a political as well as an ecological entity, is the huge gap represented by the non-EU Balkan states. The establishment of the Desaret region as a transboundary protected landscape would begin to extend the network northwards in a comparable way to that in which the proposed International Karst Park (on the Italian/ Slovenian border) could extend it southwards.

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