

# أبحاث في تقييم الأثر على التراث

RESEARCH ON HERITAGE IMPACT ASSESSMENT

أبحاث في تقييم الأثر على التراث  
RESEARCH ON HERITAGE IMPACT ASSESSMENT



الهيئة الملكية لمحافظة العلا  
Royal Commission for Al-Ula



أثر  
ATHR  
مؤتمر العلا الدولي لتقييم الأثر على التراث  
AUULA International Conference on Heritage Impact Assessment

الهيئة الملكية لمحافظة العلا  
Royal Commission for Al-Ula



أبحاث في تقييم الأثر على التراث

RESEARCH ON HERITAGE IMPACT ASSESSMENT



مؤتمر العلا الدولي لتقييم الأثر على التراث  
ALULA International Conference on Heritage Impact Assessment

# أبحاث في تقييم الأثر على التراث

## RESEARCH ON HERITAGE IMPACT ASSESSMENT



مؤتمر العلا الدولي لتقييم الأثر على التراث  
ALULA International Conference on Heritage Impact Assessment

**Book title:** RESEARCH ON HERITAGE IMPACT ASSESSMENT

**First Edition:** 2023

684 pages - 21x23 cm

**ISBN:** 978-9953-591-75-9

All rights reserved. No part of this book may be reproduced in any electronic or mechanical means, including information storage and retrieval systems, without permission in writing from the publisher, except by a reviewer who may quote brief passages in a review.

Design and Printing by

UNIVERSAL  
PUBLISHER & DISTRIBUTOR S.A.R.L

داربكة

# أبحاث في تقييم الأثر على التراث

RESEARCH ON HERITAGE IMPACT ASSESSMENT

**اسم الكتاب:** أبحاث في تقييم الأثر على التراث

**الطبعة الأولى:** ٢٠٢٣

**عدد الصفحات:** ٦٨٤ / القياس: ٢٣ \* ٢١ سم

ردمك: 978-9953-591-75-9

جميع الحقوق محفوظة. لا يجوز نشر أي جزء من هذا الكتاب، أو اختزال مادته بطريقة الاسترجاع، أو نقله على أي نحو، وبأي طريقة، سواء كانت إلكترونية أو ميكانيكية أو بالتصوير أو بالتسجيل أو خلاف ذلك، إلا بموافقة الناشر على ذلك كتابة ومقداً.



الهيئة الملكية لمحافظة العلا  
Royal Commission for Al-Ula





التراث هو مفهوم ديناميكي ومتطور يعكس تنوع المجتمعات وتفاعلاتها مع بيئاتها ويواجه التراث العديد من التحديات في القرن الحادي والعشرين على رأسها الأثر السلبي على قيمته واصالته من المشاريع غير المدروسة وتغير المناخ وزيادة حركة السياحة، وتشكل هذه تحديات لحفظ وصون التراث. كيف يمكن الحفاظ على التراث وتعزيزه بطريقة تحترم قيمته الاستثنائية وأصالته وتكامله ويكون في نفس الوقت مصدراً للتماسك الاجتماعي والحيوية الاقتصادية والمرونة البيئية؟ هذه بعض الأسئلة التي تعالجها عمليات تقييم الأثر على التراث كأداة للحد من المخاطر التي تهدد القيمة والاهمية والاصالة والتكامل للموقع التراثية وذلك حسب متطلبات نظام ولائحة الاثار والتراث العمراني للمملكة العربية السعودية واداة تقييم الأثر التي صدرت ٢٠٢٢ من اليونسكو وهيئاتها الاستشارية الثلاث للجنة التراث العالمي الايكوموس والايكرووم والاتحاد الدولي لصون الطبيعة الحفاظ وذلك لتقييم التأثيرات التي يمكن ان تنجم عن المشاريع قبل الشروع فيها على مواقع التراث، والذي تم تصميمه خصيصاً لأصحاب القرار ومؤسسات إدارة التراث ومطوري المشاريع، ويهدف إلى المساعدة في إيجاد الحلول البديلة لتلبية أولويات الحفاظ واحتياجات التنمية في نفس الوقت.

تم اعداد هذا السجل العلمي لمؤتمر العلا الدولي لتقييم الأثر على التراث (أثر) ليحتوي على الأوراق البحثية العلمية التي قدمت وحكمت من قبل النظراء (peer review) وقبلت للنشر بالمؤتمر وتناولت

هذه الأوراق محاور مختلفة متعلقة بعمليات تقييم الأثر، وتستعرض الأوراق في السجل العلمي وباللغتين العربية والانجليزية دراسات الحالة المختلفة في مجال تقييم الأثر من قبل الباحثين المحليين والدوليين الذين يقدمون تجاربهم في اجراء عمليات التقييم والنتائج التي حصلوا عليها والتي ساهمت في تقليل مخاطر التدخلات والمشاريع على القيمة والاصالة والتكامل لمواقع التراث والخلوص بتوصيات عملية تساعد في دفع المعرفة نحو آفاق جديدة متقدمة في تقييم الأثر على التراث، بالإضافة إلى إلهام المزيد من الحوار والعمل بين صناع القرار والممارسين والأكاديميين الباحثين.

اشرف على اعداد هذا السجل وتحكيم الأبحاث لجنة علمية للمؤتمر مكونة من خبراء اللجنة الوطنية للمجلس الدولي للمعالم والمواقع (الايكوموس السعودي) والهيئة الملكية لمحافظة العلا وبمشاركة خبراء من المجلس الدولي للمعالم والمواقع (الايكوموس العالمي) وأعضاء هيئة تدريس بالجامعات السعودية.

الأستاذ الدكتور عدنان عدس  
الايكوموس السعودي



## INTRODUCTION

Heritage is a dynamic and evolving concept that reflects the diversity of societies and their interactions with their environments. Heritage faces many challenges in the 21st century, most notably the negative impact on its outstanding universal value and authenticity from ill-considered intervention and development projects, climate change, and the increase in tourism, and these pose challenges to heritage conservation. How can heritage be conserved and enhanced in a way that respects its exceptional value, authenticity and integrity and at the same time be a source of social cohesion, economic vitality and environmental resilience?

These are some of the questions that heritage impact assessments (HIA) processes address to reduce risks that threaten the value, importance, authenticity and integrity of heritage sites according to the Saudi law of antiquities and urban heritage and the impact assessment tool issued in 2022 by UNESCO and its three advisory bodies to the World Heritage Committee, ICOMOS, ICCROM, and IUCN to assess the impacts resulting from interventions in and around heritage sites, which is specifically designed for government agencies, heritage managers, and project developers, and aims to help find the best possible solutions to meet conservation priorities and development needs at the same time.

AlUla International Conference on heritage Impact Assessment (ATHAR) is held to discuss most recent scientific research papers findings and results that were peer-reviewed and accepted for publication at the conference. These papers dealt with various topics related to impact assessment processes. The papers are presented in both Arabic and English. Various case studies in the field of impact assessment by local and international researchers who present their experiences in conducting HIA processes and the results they obtained, which contributed to reducing the risks of interventions and projects on the value, authenticity and integrity of heritage sites and coming up with practical recommendations that help advance knowledge in HIA, in addition to inspiring further dialogue and actions among decision makers, practitioners and academic researchers

The preparation of this scientific proceedings was done by ATHAR's scientific committee that is composed of experts from the National Committee of the International Council on Monuments and Sites (Saudi ICOMOS), the Royal Commission for AlUla (RCU), International Council on Monuments and Sites (ICOMOS International), and academics from Saudi universities

**Prof Adnan Adas**  
**Saudi ICOMOS**



## Members of AlUla International Conference on Heritage Impact Assessment (HIA) Scientific Committee

Prof. Adnan Adas	Saudi ICOMOS	Chairman
Dr. José Ignacio Gallego Revilla	RCU	member
Mr. Mohamed Al Aidroos	Saudi ICOMOS	member
Dr. Mohamed Bagader	UQU	member
Dr. Nicholas Clarke	Heritage Futures	member
Dr. Jamal Olyan	KSU	member
Dr. Emad Pasha	KSU	member
Ms. Sheridan Burke	ICOMOS	member
Ms. Giorgia Cesaro	RCU	member
Ms. Myrto Tsitsinaki	RCU	member



## اللجنة العلمية لمؤتمر العلا الدولي لتقييم الأثر على التراث

أ.د.م عدنان عباس عدس	الايكوموس السعودي	رئيس اللجنة
د. هوزيه ناشو جاليقو ريفللا	الهيئة الملكية لمحافظة العلا	عضو
م. محمد يوسف العيدروس	الايكوموس السعودي	عضو
د. نيكولاس كلارك	مؤسسة مستقبل التراث	عضو
د. محمد باقادر	جامعة أم القرى	عضو
د. جمال عليان	جامعة الملك سعود	عضو
د. عماد باشا	جامعة الملك سعود	عضو
أ. شريدان بيرك	نائب لجنة مستشاري الايكوموس	عضو
أ. جورجيا سيزارو	الهيئة الملكية لمحافظة العلا	عضو
أ. ميرتو تستناكي	الهيئة الملكية لمحافظة العلا	عضو



190	تقييم الأثر في مواقع التراث الأثري بالمملكة العربية السعودية-العلا HIA IN ARCHAEOLOGICAL SITES IN KSA ALULA
193	GUIDELINES FOR HERITAGE IMPACT ASSESSMENTS ON VISUAL INTEGRITY IN A NATIONAL AND WORLD HERITAGE CONTEXT
217	HIA SUCCESS STORY IN ALULA; A BENEFICIAL BALANCE
247	تقييم تأثير تغير المناخ باستخدام تقنيات نظم المعلومات المكانية في العلا، المملكة العربية السعودية CREATIVE METHODS FOR HERITAGE: ASSESSING THE IMPACT OF CLIMATE CHANGE USING EARTH OBSERVATION TECHNIQUES IN AL-ULA, SAUDI ARABIA
269	تقييم الأثر التراثي للمواقع الأثرية بين الحفاظ والاستثمار لتحقيق أهداف التنمية المستدامة موقع الحجر أنموذجا HERITAGE IMPACT OF ARCHEOLOGICAL SITES: BETWEEN CONSERVATION AND INVESTMENT TO ACHIEVE SUSTAINABLE DEVELOPMENT, HEGRA AS A MODEL
297	تقييم الأثر في مواقع أخرى بالتراث الأثري بالمملكة العربية السعودية HIA IN OTHER ARCHAEOLOGICAL SITES IN KSA
299	أثر مشروع عين العزيزية على هياكل نظم الري القديمة بوادي مر الظهران (١٣٦٦ هـ - ١٣٧٦ هـ) THE IMPACT OF THE AIN AL-AZIZIYA PROJECT ON THE STRUCTURES OF THE ANCIENT IRRIGATION SYSTEMS IN WADI MUR AL-DHAHRAN (1366 AH - 1376 AH)
323	تقييم الأثر على التراث في المواقع الأثرية بمحافظة الجبيل : تقييم الإجراءات على موقع الدفي الأثر ASSESSING THE IMPACT ON HERITAGE AT ARCHAEOLOGICAL SITES IN JUBAIL GOVERNORATE KSA: THE AL-DAFI HERITAGE SITE ASSESSMENT
351	READINESS OF IMPACT ASSESSMENT AND VALUE DETERMINATION OF HERITAGE OF SAUDI ARABIA: A CASE STUDY OF THE GREATER AL-QATIF HERITAGE SITES
381	منهجية لدراسة وتقييم الغطاء النباتي في المناطق التراثية في المناطق الجافة A METHODOLOGY PROPOSAL FOR STUDYING AND EVALUATING VEGETATION COVER IN HERITAGE AREAS IN ARID REGIONS

14	تقييم الأثر في المواقع الدولية HIA INTERNATIONAL SITES
17	IMPACT ASSESSMENT OF URBAN HERITAGE SITES: THE CASE OF KHOR DUBAI, UAE
39	HIA AS A TOOL FOR SUSTAINABLE MANAGEMENT: THE NECROPOLIS OF THE ANCIENT CITY OF NESSEBAR
59	HERITAGE IMPACT ASSESSMENT FOR HISTORIC URBAN LANDSCAPE: MAURITIUS A CASE STUDY
75	SAME OLD STORY? WHY ARE ARCHAEOLOGICAL DISCOVERIES SO OFTEN UNEXPECTED? WHAT IS WRONG WITH PREVENTIVE ARCHAEOLOGY?
98	تقييم الأثر في المواقع التاريخية بالمملكة العربية السعودية HIA IN HISTORIC SITES IN KSA
100	HISTORIC JEDDAH REGENERATION MASTERPLAN: A COMPREHENSIVE STRATEGY USING HIA
125	ASSESSING MOBILITY INFRASTRUCTURE FOR WHEELCHAIR USERS IN HERITAGE SITES: THE CASE STUDY OF HISTORIC JEDDAH
145	الاستدامة الاقتصادية والاجتماعية لتطوير بيت الجوخدار بجدة التاريخية ECONOMIC AND SOCIAL SUSTAINABILITY OF THE DEVELOPMENT OF AL-JOKHDAR HOUSE IN HISTORIC JEDDAH
167	الأثر البيئي للنشاط السياحي في مواقع التراث العالمي: دراسة حالة حي الطريف بمدينة الدرعية التاريخية THE ENVIRONMENTAL IMPACT OF TOURIST ACTIVITY ON WORLD HERITAGE SITES: A CASE STUDY OF AT TURAIF DISTRICT IN ADDIR'IYAH HISTORIC CITY



586	<b>MISCELLANEOUS TOPICS IN HERITAGE</b> مواضيع متفرقة من التراث
589	التراث العمراني كمولد للإبداع المستقبلي URBAN HERITAGE AS GENERATOR OF FUTURE INNOVATION
611	دور التراث السعودي في تعزيز المدن والمجتمعات المستدامة THE SAUDI HERITAGE'S ROLE IN PROMOTING SUSTAINABLE CITIES AND COMMUNITIES
627	THE IMPACT OF THE DIFFICULTY OF OBTAINING TRADITIONAL RESTORATION MATERIALS ON THE IMPLEMENTATION OF RESTORATION PROJECTS
645	المخاطر المهددة بانقراض العمارة الطينية بوادي حزموت RISKS THREATENING MUD ARCHITECTURAL HERITAGE IN WADI HADHRAMAUT
665	THE WILD AND HIDDEN ART OF ALTAMIRA: ASSESSING THE SOCIAL VALUE OF A WORLD HERITAGE SITE


406	<b>HIA POLICIES &amp; LEGISLATIONS, FRAMEWORKS</b> سياسات تقييم الأثر والتشريعات والأطر
409	HERITAGEIZED CITIES: SIMULACRUM SOCIAL IMPACT
433	تقييم الأثر على التراث وأهداف التنمية المستدامة IMPACT ASSESSMENT ON HERITAGE AND SUSTAINABLE DEVELOPMENT GOALS / SDGS
451	تقييم الأثر وتحديات الأطر التشريعية والمؤسسية الحاكمة للمدن التاريخية المصرية IMPACT ASSESSMENT, LEGISLATIVE AND INSTITUTIONAL CHALLENGES IN EGYPTIAN HISTORIC CITIES
473	PROTECTION CHALLENGES AND HERITAGE LANDSCAPE ARCHITECTURE; THE CASE STUDY OF EGYPT
500	<b>HIA &amp; HERITAGE CONSERVATION</b> تقييم الأثر والحفاظ على التراث
503	NAVIGATING THE INTERSECTION OF CULTURAL HERITAGE PRESERVATION AND DEVELOPMENT CHALLENGES THROUGH HERITAGE IMPACT ASSESSMENT
523	IMPACT OF HERITAGE RESTORATION PROJECTS ON LOCAL COMMUNITIES ITALY & KSA CASE STUDIES
547	DIGITAL TOOLS FOR CULTURAL HERITAGE - THE SUAKIN 3D INTERACTIVE
571	ASSESSMENT OF THE USE OF INNOVATIVE METHODS AND DIGITAL RESTORATION IN THE DEVELOPMENT OF ARCHAEOLOGICAL HERITAGE SITES



# تقييم الأثر في المواقع الدولية

## HIA INTERNATIONAL SITES

- ◆ IMPACT ASSESSMENT OF URBAN HERITAGE SITES: THE CASE OF KHOR DUBAI, UAE
- ◆ HIA AS A TOOL FOR SUSTAINABLE MANAGEMENT: THE NECROPOLIS OF THE ANCIENT CITY OF NESSEBAR
- ◆ HERITAGE IMPACT ASSESSMENT FOR HISTORIC URBAN LANDSCAPE: MAURITIUS A CASE STUDY
- ◆ SAME OLD STORY? WHY ARE ARCHAEOLOGICAL DISCOVERIES SO OFTEN UNEXPECTED? WHAT IS WRONG WITH PREVENTIVE ARCHAEOLOGY?



**SAME OLD STORY? WHY ARE  
ARCHAEOLOGICAL DISCOVERIES SO OFTEN  
UNEXPECTED?  
WHAT IS WRONG WITH PREVENTIVE  
ARCHAEOLOGY?**

Stephano Compana  
University of Siena  
Department of History and Cultural Heritage  
Via Roma 56, 53100 Siena-Italy  
campana@unisi.it

## ◆ ABSTRACT

Despite the extraordinary commitment and economic resources made available by developers and construction companies we still learn, almost every day, of 'remarkable' and 'unexpected' archaeological discoveries made on development sites, often with consequent work-stoppages. In the debate on pre-development evaluation, it seems weird that nobody has yet had the temerity to shout out loud, like the little boy in the fairy story, that "the Emperor has no clothes". It is time to acknowledge the unacceptable frequency with which we have to respond to seemingly fortuitous or 'unpredicted' discoveries made when construction work is already in progress. What we see before us is surely clear evidence of a paradox: often during the planning phase for development projects we are faced by a sea of emptiness, both in our local archaeological knowledge and in our experience concerning the methods now available to us for making valid pre-development impact assessments. As a result, when the construction work begins we are often overwhelmed by a flood of unanticipated archaeological data. The problem does not lie just in the presence or absence of relevant archaeological data but also in uncertainty about how to identify and implement customised and effective strategies to deal with this important and complex sphere of archaeological practice.

**KEY WORDS:** Endangered archaeology; Preventive Archaeology; Rescue Archaeology; Unexpected Discovery; Site Development Stoppage.

## ◆ INTRODUCTION

All over the world irreplaceable archaeological remains are being destroyed without adequate preventive measures or even any significant kind of record. Every year thousands of archaeological sites are wrecked, destroying crucial evidence for the history of humanity that they could have given us. There are numerous agents of destruction, among the most impactful being intensive agriculture, looting, climate change, conflict, and development projects of one kind or another. This paper will focus exclusively on the last of these threats since these represent a very significant danger for the conservation of cultural heritage and a substantial challenge for any contemporary society. However, it is also important to emphasize that this is not the most severe and wide-spreading cause of archaeological destruction, the primacy in that respect lying with intensive agricultural practices which, ironically and even now, are hardly mentioned in many country's protective legislation. However, around the late 1960s and into the 1970s the massive surge in site and infrastructure development (and re-development) made clear in several countries the scale of the destruction of archaeological evidence. The emerging disaster resulted in the realization that actions needed to be taken within a variety of differing but interlinked framework, including the formation of new professional pursuits (in commercial archaeology and public conservation bodies) as well as in the communication of the outcomes to a wider public world (public archaeology) and in the development of a consistent political and legislative agendas (conservation measures). Depending on the differing cultural and legislative frameworks within each country the overall achievement of these changes took place in some cases rapidly but in others more slowly or in a more fragmentary way.

In Europe and other parts of the world it is possible to trace the development of so-called 'rescue' archaeology to the 1950s and early 1960s in response, especially, to major urban redevelopment in areas affected by the ravages of WWII. In the resulting 'emergency' or 'salvage' work new standards of recording and interpretation were put into effect within individual excavations and particularly within the urban and occasionally rural excavations that formed the primary activity of the first rescue archaeology units set up in the late 1960s and the following decade.

Soon, however, the concept of 'rescue archaeology' as a simple and straightforward site-based operation faded in the face of the urgent need to record the evidence of

hundreds of sites as they were about to be destroyed or seriously damaged by one kind of construction work or another. Archaeologists had also realized that they could no longer operate in isolation. In various ways from country to country this slowly produced a progressive development of a link between archaeology and planning departments. In particular, the response to major infrastructure projects undertaken at this time brought about a surge in the demand for pre-development archaeological investigation and impact assessments. At that time pre-development archaeology in other than densely built-up urban contexts was largely based on a limited number of prospection methods, in particular aerial photography and field walking survey, as well as on various forms of 'trial trenching' within the specific areas scheduled for development at that time (Jones 1984).

A major milestone in the further development of this framework, however, arrived with the promulgation by the Council of Europe in 1992 of the so-called Valletta Convention on the protection of archaeological heritage. The Convention defined a standard way of managing the archaeological heritage, identifying the protection of heritage assets within archaeology as a pivotal necessity within the processes of landscape planning and policymaking. Moreover, the Convention highlighted the prominence of pre-development archaeological evaluation within any construction work and promoted the use of non-destructive methods of investigation to assess the buried record. In the practice of fieldwork archaeology, the impact of the Valletta Convention was relatively limited, at least in the short term. However, over the years, the Convention's insistence on the concept of archaeology as a mandatory and socially relevant step in the planning process has become widespread and publicly accepted throughout almost all parts of Europe. Each country has adopted and implemented the Convention through its own timescale and within its own specific formula, taking account of political and legal peculiarities as well as differing concepts of archaeology and economic environments. However, the implementation of the Convention has generally led to a rethink in the concept of 'rescue', 'salvage' and 'emergency' archaeology. The explicit aim of formally introducing the Convention's provisions within the planning process for all forms future development projects led to the labeling of this activity through such terms as 'preventive', 'development-led', 'pre-development' or 'planning-led' archaeology.

## ◆ From 'rescue-led' to 'development-led' archaeology

It may be useful to explore a little more deeply the difference between 'rescue' archaeology and 'preventive' archaeology. Starting from the concept that archaeological remains are a finite and irreplaceable resource, their presence should be a material consideration in all applications for permission to undertake new development, as is by now the established practice in most countries of Europe and many beyond. It is widely accepted that many development proposals may have a potential impact on archaeological deposits and that harmful effects must therefore be mitigated whenever possible. Moreover, recent approaches have aimed to achieve planning processes that seek to minimize the occurrence of unforeseen problems during development and to prevent, reduce or eliminate calls for 'emergency' work. Here, it is crucial to understand that 'preventive' archaeology is not 'rescue' or 'salvage' archaeology: its aim, instead, is to prevent, contain and minimize the need for these responses. Indeed, the whole purpose of the Valletta Convention, as well as of most recent declarations on the subject, revolve around the importance of evaluating an area or a landscape for its archaeological potential **in advance of** development, in order to inform subsequent planning and management decisions.

So-called 'rescue' archaeology eventually became widely understood to encompass archaeological survey, recording and excavation carried out in areas threatened by urban or other developments, whether undertaken by private or public bodies (Rahtz 1974). Within the newer term as 'preventive' archaeology, public developments might include work related to railways, gas and oil pipelines, underground power cables, mining and quarrying, dams, barrages, harbour improvements and major construction projects for schools, hospitals, sports facilities, shopping malls and so forth. Unlike survey and excavation work within the academic sphere, 'preventive' archaeology is often carried out, like the developments themselves, under severe pressure of time and financial expenditure. This kind of archaeological work is undertaken primarily on sites that are about to be destroyed or, occasionally, as a protective measure to preserve or record archaeological features identified when construction work is already in progress beneath urban or rural areas.

Use of the term 'rescue archaeology' is largely restricted to Europe, North America, South America, MENA region and East Asia. Across much of this area the term is virtually synonymous with rescue excavation, in the form of a vast number of small-scale 'test'

excavations or trial trenching of one kind or another with the aim of reducing the destruction of archaeology uncovered during urban development or re-development already in progress. By contrast, the starting point for 'preventive archaeology' is completely different: it rests securely within the planning process in advance of actual development. In this new perspective archaeology should be considered as a key consideration in urban and landscape planning, alongside geology, hydrology, and other environmental factors. It should be clear that 'preventive archaeology' and 'rescue archaeology' are completely different approaches – they are entirely opposite reactions both in theory and in practice. Essentially, the aim of 'preventive' archaeology is to replace 'rescue' archaeology as much as ever possible, making interventions through 'emergency' or 'salvage' work exceptional, necessary only when diagnostic and predictive archaeology have failed.

It should also be obvious from these comments that, to apply any effective planning approach, specific and well-defined legislation is necessary. Timing is of the essence here: to be effective, substantive archaeological information should be available from the very start of feasibility studies when major construction projects are first contemplated. Archaeological (and environmental) evaluation, and the response to its conclusions, should be undertaken before any planning permission is granted. If this condition is not satisfied the balance of necessity reverts in one way or another away from 'preventive' archaeology to the manifest inadequacies of 'rescue' archaeology. Currently, the relationship between 'rescue' archaeology and 'preventive' archaeology constitutes something of an archaeological 'hot potato', a problem difficult to deal with in many countries. On the one hand there is the problem that in many cases state bodies have tried to adapt the methods of 'rescue' archaeology to the new needs of 'preventive' archaeology without considering the opportunity to develop entirely new methods consistent with the needs of a new discipline that is in direct antithesis to the previous one. Furthermore, applying trial trenching as the main method of risk assessment in preference to any more comprehensive non-destructive diagnostics does not solve the problem in any way at all: where there are no trial trenches we have no information and therefore we cannot make any reliable planning decision: the risk of unexpected findings and work stoppages continues to be huge. However, in the author's view it would be a mistake to consider this issue just as a technical and procedural one. It represents much more than that: indeed, it poses a real cultural challenge which might lead, as suggested in this contribution, to new lines of thought in the field of archaeology, conservation, and heritage management, as well as in the

administrative, political and legal framework within which they operate. Moreover, bearing in mind the systematic and on-going reduction of funding for archaeology within research institutions, it is easy to predict – on the principle that 'the polluter pays', now currently followed in many countries – that most of the funding destined for use within archaeology will in future be devoted almost exclusively to preventive archaeology. This will most likely lead to financial speculation on the part of powerful lobbies and large investors.

## ◆ WHAT HAPPENS IN PRACTICE?

Although there is a whole series of differences in the ways in which individual countries have been putting 'preventive' archaeology into practice, it usually entails four major steps (Boschi 2016):

1. Evaluation aimed at identifying and mapping archaeological evidence within, along or around the development site.
2. Protective measures targeted at avoiding damage and indicating what kind of archaeological investigation should be carried out if damage cannot be prevented.
3. Fulfilment of specified protective measures, usually through archaeological excavation and detailed recording of the observations made.
4. Data analysis and reporting, in both specialist and non-specialist publications.

As already stressed above, archaeological evaluation plays a core role in giving archaeologists, archaeological consultants and institutions the chance to start afresh with a new approach, moving from methodologies developed in the field of landscape archaeology over the past forty years or so, for instance, the opportunity to undertake non-destructive investigations within the evaluation process. This might entail, as happens in the field of medical diagnostics and also on crime scenes, investigations to acquire detailed evidence that might otherwise remain undiscovered or invisible. The result would hopefully help to ensure a more effective and well-focused information base so as to inform and improve the planning process. At the same time, especially for major infrastructure projects in rural contexts, such as motorway developments, this prior investigation could involve the adoption of new approaches in place of the kind of topographical research that results in the depiction of 'sites' represented by dots on distribution maps, surrounded by a sea of 'emptiness' (Powlesland 2009). Indeed, within that kind of approach, however carefully undertaken, a massive amount of potentially recoverable information necessarily remains undetected between the so-called 'sites'. To give us an understanding of past landscapes in such a context, and therefore a reliable evaluation of the archaeological potential as a trustworthy support for the planning process, it should surely become mandatory (as an ethical and practical imperative) to map the archaeological landscape as an all-embracing 'continuum' across space and time, using whatever technical means and methodologies are now available. Gaps, uncertainties and absences of evidence must be confronted and reduced as much as ever possible (Campana 2018).

This notwithstanding, the regulations currently in force across Europe seem for the most part to meet this practice, imposing a preventative assessment procedure and embracing the need for archaeology to take an active part in development planning. Sadly, however, in many countries (among them, it is worth to mentioning, France, Italy and Germany) current practice, despite notable exceptions, often takes little or no account of these needs and opportunities. On the contrary, the planning provisions for individual development projects often still place reliance on what can best be described as 'rescue excavation' in the form of large-scale mechanical stripping followed, sometimes, by open-area excavation or little more than small-scale test excavations (Carver et al 2015).

In the author's experience, this prevailing approach gives little weight to the evaluation process. As currently applied, this stage is treated in practice as little more than a 'desktop' exercise, primarily based on the collection of published information (archaeology, place-names and landscape physiography etc) and occasionally by a preliminary visual inspection on site. This is an approach which has been shown by academic studies from the 1990s onwards to be totally unrepresentative of reality, and therefore equally inadequate as support for a satisfactory analysis of the archaeological potential of the landscape within the development area. Within this antiquated approach air-photo interpretation (and occasionally new aerial photography) is sometimes taken into account but active field survey is undertaken only rarely and LiDAR data is almost never brought into consideration. This kind of preparatory work, based for the most part on existing knowledge rather than the outcome of systematic field-walking survey and artefact collection (or other forms of field survey or sample collection) has long ago been shown to reveal, in the Italian context at least, no more than 5-10% of the potentially available information about the existence or character of surface and sub-surface archaeological features, especially within the open countryside (Guaitoli 1997; Francovich et al. 2000).

As a logical consequence, a 'negative' or inconclusive/poor assessment would lead in most cases to the developer being advised that construction work could start without further investigation. In practice, however, this rarely happens since public authority staff are fully aware of the uncertainties involved in this kind of report. They, therefore, prudently, and wisely, suggest further investigation, generally based on trial trenching which might eventually lead to one scale or another of archaeological excavation. This kind of trial trenching has its drawbacks; instead of gaining any real advantage from the application of seemingly 'preventive' approach we are substantially back to 'rescue' archaeology, meaning a random outcome with a high probability of unforeseen

discoveries during construction works, along with high pressure from politicians and/or the developer's shareholders, and inadequate time to carry out whatever archaeological response eventually becomes necessary. This feeble implementation of the evaluation phase, with investigation grounded primarily in mechanical stripping and 'emergency' excavation or to a systematic (but often ineffective) 'watching brief', is in the author's view dangerous and potentially very damaging to the country's archaeological and landscape heritage. Within this kind of procedure it is often difficult, both intellectually and physically, to identify archaeological features, with the result that a large amount of 'perishable' evidence or ephemeral cultural information may inevitably be lost. Moreover, it must never be forgotten that any archaeological excavation is an inherently destructive and irreversible process; large-scale mechanical stripping by caterpillar merely exacerbates this problem, often dramatically so. Ironically, this approach also tends to increase both costs and construction times. There should surely be no argument about these conclusions – they are clearly consistent with longstanding international recommendations on the protection of the archaeological heritage, as set out for instance in the Valletta Convention of 1992 and in the Faro Convention on the Value of Cultural Heritage for Society (2005).

Within this framework, in recent years, there have been innumerable interventions specified by conservation bodies and carried out by public archaeologists or commercial companies. It cannot go unrecognized, by now, that decades of salvage or 'rescue' archaeology and supposedly 'preventive' archaeology based on trial trenching and large-scale excavation – notwithstanding their inherent limits – have produced an immense amount of new data. Nevertheless, despite the extraordinary commitment and economic resources made available by developers and construction companies we still learn, almost every day, of 'remarkable' and 'unexpected' archaeological discoveries made on development sites, often with consequent work-stoppages. It is time to recognise the unacceptable frequency with which we have to respond to seemingly fortuitous or 'unpredicted' discoveries made when construction work is already in progress. What we see before us is surely clear evidence of a paradox: often during the planning phase for development projects we are faced by a sea of emptiness, both in our local archaeological knowledge and in our experience in using the methods now available to us for making valid pre-development impact assessments. As a result, when the construction work begins we are often overwhelmed by a flood of unanticipated archaeological data. In reality, the problem does not lie just in the presence or absence of relevant archaeological data but also in uncertainty about how to identify and implement customised and effective strategies to deal with this important and complex

sphere of archaeological practice.

However, there are countries where much has been done to develop increasingly effective and in-depth impact assessment based on innovative approaches and non-destructive methods, substantially strengthening the evaluation phase; among them it is worth mentioning the United Kingdom, the Republic of Ireland, the Netherlands, Spain and Slovenia). A fundamental aspect to be borne in mind is that integrated, large-scale and continuous archaeological prospection and development-related fieldwork (in particular, large-scale excavation) share responsibility for the resulting flood of archaeological data. This means that, at least to a certain extent, the two methodological approaches tell us the same thing. The overall result is exactly the same: the identification of an unprecedented density of archaeological evidence, much of it of potential value in academic studies carried out within the chronically underfunded University sphere.

## ◆ PAST AND ON-GOING EXPERIENCE: BREBEMI AND EMPTYSAPES PROJECTS

The both projects carried out by the present author were developed also to contribute to many of the heuristic and methodological challenges facing the issues as described above. In 2009 the author was serving a double role as a faculty member of the University of Siena but also, in collaboration with a number of colleagues, acting as executive president of a newly formed spin-off company aimed at transferring to the marketplace some of the expertise developed within the University's Laboratory of Landscape Archaeology and Remote Sensing. Early that year he received a call from a group of contractors who had underestimated the possible archaeological implications of a project to which they were already committed, the construction in northern Italy of a 100 km motorway linking the cities of BREscia, BERgamo and Milan, hence the project's acronym BREBEMI. The project had been initiated before the new law came into effect, so any kind of evaluation assessment was already out of the question. The superintendence in Lombardy required the motorway contractors to carry out 'excavation by surface stripping' over the whole of the area affected by the motorway construction. In the view of the contractors that request was both logistically and financially nonsensical since it would have increased the cost and time-span of the project to an unmanageable degree. As a result, the contractors were looking for an alternative archaeological solution, which might prove acceptable to the superintendence. By chance this gave rise to the first opportunity in Italy to test the operation of the new law by undertaking the systematic and innovative use of a range of non-invasive techniques to minimise the risk of archaeological recovery that would inevitably be caused by a large infrastructure project of this kind. The archaeological strategy devised for the resulting assessment (Figure 1, left) envisaged the systematic collection of historical and geographical data, the interpretation of documentary sources, geomorphological studies, the analysis of existing vertical air-photographs and the initiation of oblique aerial photography and LiDAR survey along the whole of the motorway corridor, in some cases including a substantial buffer zone on either side. A crucial innovation in the strategy, however, was the decision to collect large-scale contiguous geophysical data, both magnetic and geo-electrical, along the course of the motorway corridor, building on an approach successfully applied in a variety of contexts in Italy, France and above all the UK (Campana & Piro 2009). Systematic test excavations were also planned to explore or verify anomalies identified by any or all of

these techniques. Independently, the regional superintendence designed a pattern of random test trenches amounting to a 5% sample of the motorway corridor (Campana & Dabas 2011). Within the BREBEMI company a GIS was designed to integrate, manage and share (in real time with the contractors as well the Superintendence of Lombard Region) the collected data at all stages from data acquisition to interpretation and field checking, so as to assess any significant findings and to develop 'predictive' archaeological models. The aim was to reduce the degree of uncertainty about the possible presence of archaeological remains by producing a detailed and continuous map based on a holistic and essentially non-destructive approach to landscape archaeology, allowing the superintendence and contractors to plan their activities in the best manner possible. The archaeological assessment started in May 2009 and over no more than four months of multifaceted investigation it proved possible to collect and interpret a vast amount of data, greatly enriching the archaeological and environmental understanding of this particular stretch of landscape. The collection and interpretation of this data also helped the motorway contractors to plan in advance for archaeological work, which might otherwise have necessitated delays and extra expenditure during the construction work. Moreover, an outstandingly rich, continuous and detailed body of archaeological documentation was created for the whole of the area affected by the motorway, providing at the very worst a degree of 'preservation by record'.

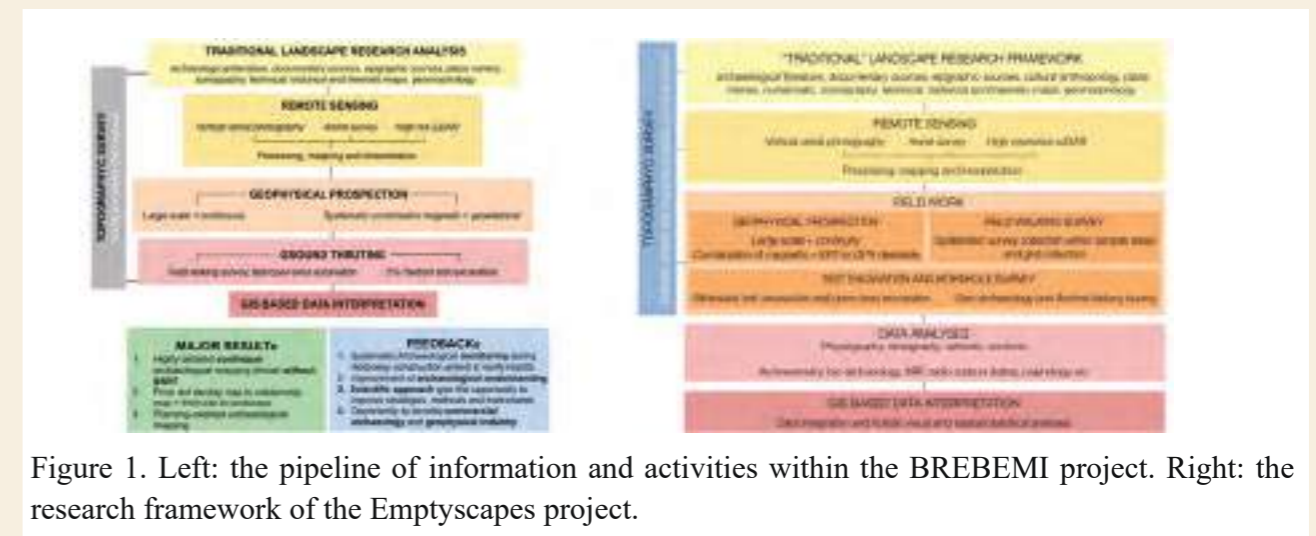


Figure 1. Left: the pipeline of information and activities within the BREBEMI project. Right: the research framework of the Emptyscapes project.



This experience also represented an invaluable opportunity for sharpening and deepening ideas about preventive archaeology in the Italian context, especially as regards the advantages and disadvantages of the range of techniques and working methods applied for the first time to such a large extent within the BREBEMI project. Naturally, there are no easy answers to the complex questions raised by the introduction of planning led approach. The BREBEMI project, however, made it possible for a consortium of archaeologists and others to collect a huge amount of potentially informative data in a very short time: 438 ha of geophysical measurements (both magnetic and geo-electrical), informative oblique air-photography, 150 km<sup>2</sup> of high-resolution LiDAR data, hundreds of specifically-targeted test excavations, evidence for thousands of archaeological features as well as for topography, geomorphology and other environmental factors (Campana & Dabas 2011).

The assessment work failed to detect subsequently discovered archaeological features in only one instance, very early in the evaluation process when only a limited range of evidence was available (Campana & Dabas 2011). The mechanical excavation and trial trenching specified by the superintendence also failed, showing some worryingly serious limitations. However, the point here is not to argue about which approach is the better. In the right circumstances, and deployed in the right way, both can be useful and in some instances mutually complementary. The key issue is that while non-destructive methods, and skilled interpretation of the resulting data, can be expected to improve in reliability over time, the same can not be said for the investigation based on 'in the field' reaction to mechanical stripping rather than on prior survey and targeted on-site recording and stratigraphical excavation. Another key point is that it is not possible to validate the results of this 'reactive' kind of excavation work. Every archaeologist knows that excavation destroys the evidence upon which it relies, especially if it is not carried out within a suitable methodological framework and timescale. By contrast it is entirely possible – and desirable – to use stratigraphical excavation to verify and interpret potential archaeological features recorded initially through geophysical or other forms of non-invasive prospection.

The second experience that can be worth to present here derives from a long-lasting academic research project named, Emptyscapes. In recent years there has been a revolution in the archaeological methodologies used for study of the ancient landscape. A wide variety of 'new' remote sensing methods are now increasingly widely deployed for archaeological exploration and mapping. In addition to the improvement in technical capabilities we have also seen the beginnings of a conceptual change. Archaeology has traditionally been focused upon individual locations – 'sites' – which we have sought

to identify and then explore through excavation and the analysis of the finds from them. Although pragmatically understandable, the division of the world into a series of isolated sites is conceptually problematic since human beings do not just exist at particular points in the landscape but rather utilise the whole of their surroundings in a wide variety of different ways. Given that the same was true in the past, and that we increasingly have technologies to explore whole tracts of landscape, archaeology is moving towards changes in approach that seek to explore and understand the reality of total past landscapes. The Emptyscapes project is part of this new approach to the study of landscapes and represents the first experience of this type in the Mediterranean area.

In the context of archaeological assessments in rural areas this project could perhaps be seen as an 'outrider' for what could be achieved in the Mediterranean area by drawing upon approaches most extensively used up to now in the UK and in some parts of continental Europe (particularly Austria, Belgium, France and Germany). The aim is to encourage more sophisticated approaches to landscape archaeology in Italy and other parts of the Mediterranean world, replacing an essentially site-based approach by a more comprehensive 'landscape' perspective. The resultant picture would be less about 'sites' than about a populous landscape in the social, economic and environmental context, with field systems, communication routes, trade networks and industrial and agricultural foci in addition to domestic settlements – all seen as a developing process in the *longue durée*, the long-sought 'archaeological continuum' (Powlesland 2009; Gaffney et al. 2012; Keay et al. 2013). However, within the present context the project's research strategy falls into four interlinked 'traditional' and 'innovative' categories that are summarised on the right-hand side of Figure 1, right.

Geographically, the project focuses on two sample areas in Central Italy: the lowland rural landscape around the hilltop Etruscan and Roman town of Rusellae, in South Tuscany near Grosseto (to be discussed here); and the now-rural but once-urban landscape of the ancient city of Veii in Central Latium, near Rome (Campana 2018). The Rusellae sample area can serve as a useful example the potential contribution of this approach to landscape studies within the needs and perspective of Preventive Archaeology<sup>1</sup>.

<sup>1</sup> For further information on the archaeological objectives leading the research in this area, the historical background and new answers and questions provided by this research: Campana 2018 and Campana 2023.

In this area, after an intense and decades-long research activity by archaeologists at the University of Siena (strongly based on field-walking and aerial photography), we thought had reached, at least to a reasonable extent, a level of substantial saturation in the discovery of 'new' sites. Over the past decade a research team led by the author has been working on this sample area, using a thoroughgoing 'landscape' approach based on systematic prospection aimed at locating, identifying and documenting the archaeological resource in the chosen study areas. This landscape has been documented by multi-stage archaeological research involving an assessment of existing knowledge, field-walking survey and airborne remote sensing (satellite, air-photography and LiDAR prospection) plus – of particular relevance to the present discussion – large-scale contiguous magnetic exploration so far covering 1100 ha in all (plus 30 ha of resistivity data).

So, after this amount of scientific effort have we in fact improved the overall picture? Have we made progress towards the goal of exploring the 'archaeological continuum'? Which new scenarios have been opened up from the point of view of landscape planning and pre-development archaeological evaluation? The work carried out so far, has made it possible to recognize a significant amount of archaeological evidence which would have been entirely unidentifiable if restricted solely to the use of the 'traditional' research methods of field-walking survey, surface collection, artifact studies and documentary research). Effectively, the overall results to date have multiplied the amount of previously known information by a factor of thirty or more. However, this is not just a matter of the simple quantity of evidence, but also of improvements in the quality and articulation of the interpretations that can be achieved, providing new opportunities for understanding a variety of phenomena, contexts and phases of development within entire socio-economic systems (Campana 2018; Campana 2023; <http://www.emptyscapes.org>).

Within the tightly focused sample area between Rusellae and Grosseto, outlined in Figure 2, systematic investigation using the traditional sources of ancient topography had already identified a considerable amount of information. Overall, there were 80 known archaeological 'sites' of various kinds (Roman villas, farms, cemeteries, furnaces etc) within the sample area. Caution is of course required in making a comparative quantification of results produced by the 'traditional' methods as compared with the wider and more closely integrated range of activities and analytical methods used in the most recent work. That said, these integrated methods have so far produced 2746 new items of evidence, considerably expanding not only the quantity but also the varying types of evidence, in many cases recording features entirely undetected in the past –

fences, settlements, burial mounds, tombs, agricultural field systems, buildings, ditches, pits, roads, canals and so on (Figure 2). The long and continuing period of research based on non-invasive detection systems has been complemented since 2017 by three small-scale excavation campaigns at key locations –, Salica, Brancalete and Aiali, aimed at achieving a better understanding of the evidence identified so far, both at those locations in particular but also within the wider area under investigation through the analysis of stratified geomorphological samples and organic remains, linked wherever possible to radiocarbon dating. Overall, we have carried out an open area excavation (600 m<sup>2</sup>) and 20 targeted test excavations of varying sizes between 15- 100 m long and 1,3 m wide for a total of 2000 m and a surface of 2600 m<sup>2</sup> with depths of up to 3 m below the topsoil.

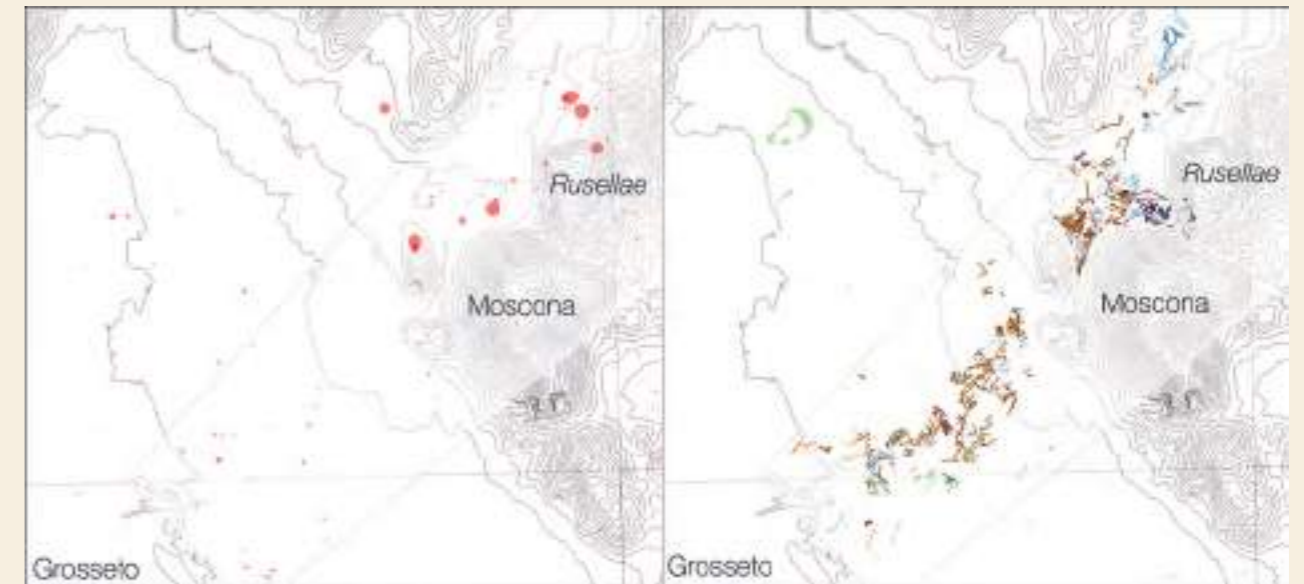


Figure 2 – The territory between Rusellae and Grosseto: general visualization of the evidence identified through a traditional approach based on field walking survey (on the left) and through the integration between 1000 hectares of extensive geophysical survey, several episodes of exploratory aerial survey by light aircraft, four years of aerial survey by drone, analysis of high-resolution lidar data (airborne and by drone) and the detailed examination of high-resolution satellite imagery (on the right).

The integration between extensive and continuous prospection and targeted stratigraphic sampling is aimed at the direct analysis of the features concerned but above all at revealing the potential physical and stratigraphical relationships between them; furthermore, test excavations allow us to improve the overall detail of the investigation and to implement geoarchaeological and bioarchaeological sampling and analyses. This approach has allowed us to access completely new scenarios, far beyond our expectations.

The awareness that landscape is always made up of a continuous and inter-related sequence of stratification, without gap, is nothing new. As we know, since the 1970s (if not earlier) archaeologists have been well aware of the spatial continuity of the archaeological record. An element of innovation in this case study, however, lies in the implementation and generally positive outcome of a pro-active research strategy that has allowed us to grasp and document at least in part the archaeological continuum. More work is also necessary elsewhere, especially through non-invasive survey and targeted minimalist excavation, and equally importantly through the collection and analysis of geomorphological and bio-archaeological samples at critical points within the developing landscape. However, we believe that the results achieved so far should make us reflect on what had been understood hitherto through past approaches strongly based on fieldwalking survey, and of course what our next moves might be. We have clearly shown that in appropriate circumstances this type of multi-method landscape survey can be extremely effective, facilitating a substantial reduction in the physical and chronological gaps traditionally present in the archaeological record. The gains made so far undoubtedly move us significantly closer to achieving the exploration of the past as a truly archaeological continuum. The research approach based on the integration of a wide variety of methods – radiocarbon dating, geophysical prospection and other remote sensing techniques as well as fieldwalking survey – can clearly have a fundamental impact on our understanding of landscape transformations by clarifying the physical characteristics and stratigraphical relationships of the features concerned (both structural and infrastructural components). It is important to stress here that the key point in relation to Preventive Archaeology is that these previously ‘invisible’ settlements, roads, field systems, enclosures, graves, burial mounds and so forth would have been at **risk of damage or destruction** by development proposals if the archaeological evaluations had been conducted as an essentially ‘desktop’ exercise of the kind outlined at the beginning of this article and if the following phase, as it usually happens, was entirely or strongly based on test excavations or mechanical stripping.

## ◆ CONCLUSIONS

It is entirely reasonable to claim that the results from Italy described above, along with many other case studies from across Europe and beyond, have established a new paradigm for landscape survey and for evaluation practices within Preventive Archaeology. It is worth reiterating that the application of these new methods in large-scale surveys in various parts of Europe has radically transformed archaeologists’ views about almost every aspect of the past within the areas concerned (Gaffney et al 2013; Evans et al 2023). In this context, the results from the BREBEMI and Emptyscapes projects have made a strong case for the potential effectiveness of this approach to rural landscape studies in Italy and by extension, perhaps, in other parts of the Mediterranean area. The manner in which previously unsuspected features have been revealed across time has shown that the elusive ‘archaeological continuum’ is within our grasp in the particular but varying environmental and archaeological conditions of the Mediterranean world. There are even internationally recommended guidelines for the application of these methods within a wide variety of different contexts (Schmidt et al. 2015) and there is an undeniable case for their increased use in Preventive Archaeology. One further observation might be appropriate here. Experience gathered so far, both within the academic environment and in development-related archaeology, has shown that an absence of detectable human activity is very much the exception rather than the rule. The impact of this realisation should not be underestimated – it becomes a total misunderstanding to ask questions in terms of the presence or absence of evidence. In theory as well as in practice it is now widely accepted that almost every square metre of the landscape has been altered, directly or indirectly, by human intervention in the distant or more recent past (Broodbank 2013). As a consequence almost any development proposal is likely to have an impact on the surviving evidence of such activity.

Of course, it would be foolish in this context to propose that development must not happen. This is clearly an untenable position, but how are we going to document archaeology at best and avoid or at least reduce the losses that must inevitably follow? Surely the finest protection would be the mandatory employment of strategies involving the use of the best available non-invasive techniques over the whole area (reducing gaps as much as possible) for revealing these fragile but as yet barely recognised traces of the past. A crucial aspect that needs improvement lies in the speed of the survey

work. We need to move from mid-scale to very large-scale geophysical prospection. Some possible solutions in this context are already under study in our laboratory work at the University of Siena (<http://www.lapetlab.it>). In the sphere of keywords for the next few years such as drone platform, survey automation, artificial intelligence (Orengo & Garcia-Molsosa 2019; Campana 2020; Stele et al 2023). Secondly, to make sense within Preventive Archaeology, this approach ought to be implemented **as a compulsory part of the evaluation phase**, before any significant planning decision are made. The process, and in particular the evaluation stage, needs to be substantially reinforced so as to provide a secure basis for making well-informed choices long before development work begins on site. Another fundamental change of attitude lies in ceasing to treat non-destructive investigation and archaeological excavation as antagonists. They are not at all: the BREBEMI and Emptyscapes projects in Italy, along with many other instances within Europe and elsewhere, have demonstrated that when they are used correctly they are complementary, and the outcomes are extraordinary and effective. The criticality of both approaches lies in their use in isolation! For archaeologists, planners and developers alike this would offer the opportunity of avoiding fortuitous or unexpected discoveries, reducing damage, destruction and delay as well as helping in the formulation of consistent policies for cultural and landscape sustainability in the longer term.

## ◆ ACKNOWLEDGEMENTS

The author owes a huge debt of gratitude to the BREBEMI company for the great opportunity and trust. The author is further indebted to the Geostudi Astier company in Germany, and to Klaus Leidorf of Luftbilddocumentazion for the aerial photography that he organised and carried out in that context.

The Emptyscapes project would not have been possible without the financial support of the European Union through the Marie Curie action (FP7-PEOPLE-2013-IEFn.628338) and the Culture 2007 ArchaeoLandscapes Europe project (Grant Agreement nr. 2010/1486/001-001).

Sincere thanks are also due to the Archaeological Superintendence of Lombardy and Tuscany for their open-minded intellectual debate and problem-solving approach to the project work described above.

Finally, heartfelt thanks go to two special friends who have followed and inspired so much of the writer's research work since early in his career, Chris Musson and Prof Dominic Powlesland. As ever, they have helped with constructive criticism and comments throughout all stages of the work described here.

## ◆ REFERENCES

BROODBANK, C. 2013. The Making of the Middle Sea a History of the Mediterranean from the Beginning to the Emergence of the Classical World. New York: Thames & Hudson.

BOSCHI, F. (ed.) 2016. Looking to the Future, Caring for the Past. Preventive Archaeology in Theory and Practice, Bologna: Bononia University Press.

CAMPANA, S. 2018. Mapping the Archaeological continuum. Filling 'empty' Mediterranean Landscapes, New York: Springer.

CAMPANA, S., 2020, Drone-Based Imaging in Archaeology. Current applications and future prospects, in D.R. Green, B.J. Gregory & A. Karachok (eds.), Unmanned Aerial Remote Sensing: UAS for Environmental Applications, London: CRS press Taylor & Francis: 217-238.

CAMPANA, S. 2023. "Infrastructure, Water Management, Settlement, Agriculture, and Funeral Landscapes near Rusellae in the longue durée." In Archaeological Landscapes of Late Antique and Early Medieval Tuscia (AD 400-1000), ed. R. Rao and A. Sebastiani. Turnhout: Brepols.

CAMPANA, S. & S. PIRO (eds.) 2009. Seeing the unseen. The Netherlands: Taylor & Francis.

CAMPANA S. & M. DABAS. 2011. Archaeological Impact Assessment: The BREBEMI Project (Italy). Archaeological Prospection 18: 139-148.

CARVER, M., B. GAYDARSKA & S. MONTON-SUBIAS (eds.) 2015. Field Archaeology from Around the World. Ideas and Approaches. New York: Springer.

EVANS, C., O. ALDRED & A. COOPER 2023. "Dense pasts: Settlement archaeology after Fox's The archaeology of the Cambridge region (1923)". Antiquity: 97, 1-19.

FRANCOVICH, R., A. PELLICANÒ & M. PASQUINUCCI (eds.) 2000. La carta archeologica. Fra ricerca e pianificazione territorial. Florence: All'Insegna del Giglio: 83-116.

JONES, B. 1984. Past Imperfect. The Story of Rescue Archaeology, London: Heinemann Educational Books.

KEAY, S., G. EARL, G. BEALE, N. DAVIS, J. OGDEN, K. STRUTT, F. FELICI, M. MILLETT, S. KAY & R. CASCINO. 2013. Challenges of port landscapes. Integrating geophysics, open area excavation and computer graphics visualization at Portus and the Isola Sacra, in P. Johnson & M. Millett (eds.) Archaeological Survey and the City: 303-357. Oxford: Oxbow books.

GAFFNEY, C., V. GAFFNEY, W. NEUBAUER, E. BALDWIN, H. CHAPMAN & P. GARWOOD. 2012. The Stonehenge Hidden Landscapes Project. Archaeological Prospection 19 (2): 147-155.

GUAITOLI, M. 1997. Attività dell'Unità operativa Topografia antica. Metodologie di catalogazione dei beni archeologici, Beni archeologici-Conoscenza e tecnologie. Quaderno 1 (2): 9-50.

Orengo, H.A. & A. Garcia-Molsosa 2019. A brave new world for archaeological survey: Automated machine learning-based potsherd detection using high-resolution drone imagery. Journal of Archaeological Science: 112, <https://doi.org/10.1016/j.jas.2019.105013>

POWLESLAND, D. 2009. Why bother? Large scale geomagnetic survey and the quest for "Real Archaeology" in S. Campana & S. Piro (ed.) Seeing the unseen: 167-182. The Netherlands: Taylor & Francis.

RAHTZ, P.A. 1974. Recue Archaeology, Middlesex: Penguin Books.

SCHMIDT, A., P. LINFORD, N. LINFORD, A. DAVID, C. GAFFNEY, A. SARRIS & J. FASSBINDER (eds.) 2015. EAC Guidelines for the Use of Geophysics in Archaeology. Questions to Ask and Points to Consider. Available at: [http://european-archaeological-council.org/files/eac\\_guidelines\\_2\\_final.pdf](http://european-archaeological-council.org/files/eac_guidelines_2_final.pdf) (accessed 29 February 2016).

STELE, A., L. KAUB, R. LINCK, M. SCHIKORRA & J.W.E. FASSBINDER 2023. Drone-based magnetometer prospection for archaeology. Journal of Archaeological Science: 158. <https://doi.org/10.1016/j.jas.2023.105818>



مؤتمر العلاء الدولي لتقييم الأثر على التراث  
ALULA International Conference on Heritage Impact Assessment

# أبحاث في تقييم الأثر على التراث

RESEARCH ON HERITAGE IMPACT ASSESSMENT



[www.saudi-icomos.org](http://www.saudi-icomos.org)

الهيئة الملكية لمحافظة العلاء  
Royal Commission for Al-Ula



[www.rcu.gov.sa](http://www.rcu.gov.sa)