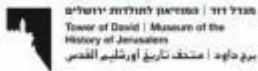


סדנה בין-לאומית International Workshop



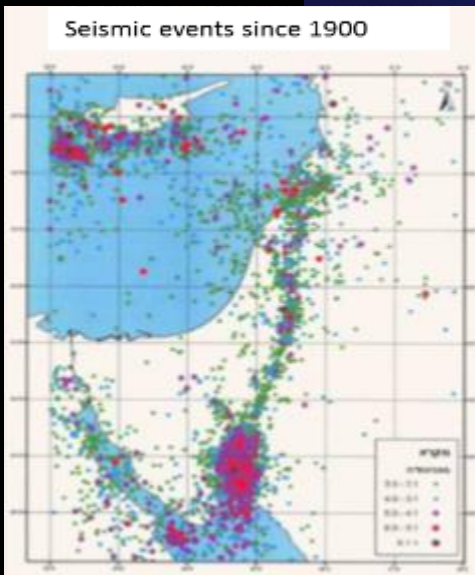
Seismic Risk Preparedness and Mitigation of Culture Heritage Sites
מוכנות והיערכות לסיכונים רעידות אדמה באתרי מורשת תרבות

ירושלים. יח' יט' בשבט, תשע"ד Israel, Jerusalem. 19-20 January 2014



Risk Map of Culture Heritage Sites in Israel- Seismic Risk to Archaeological Sites

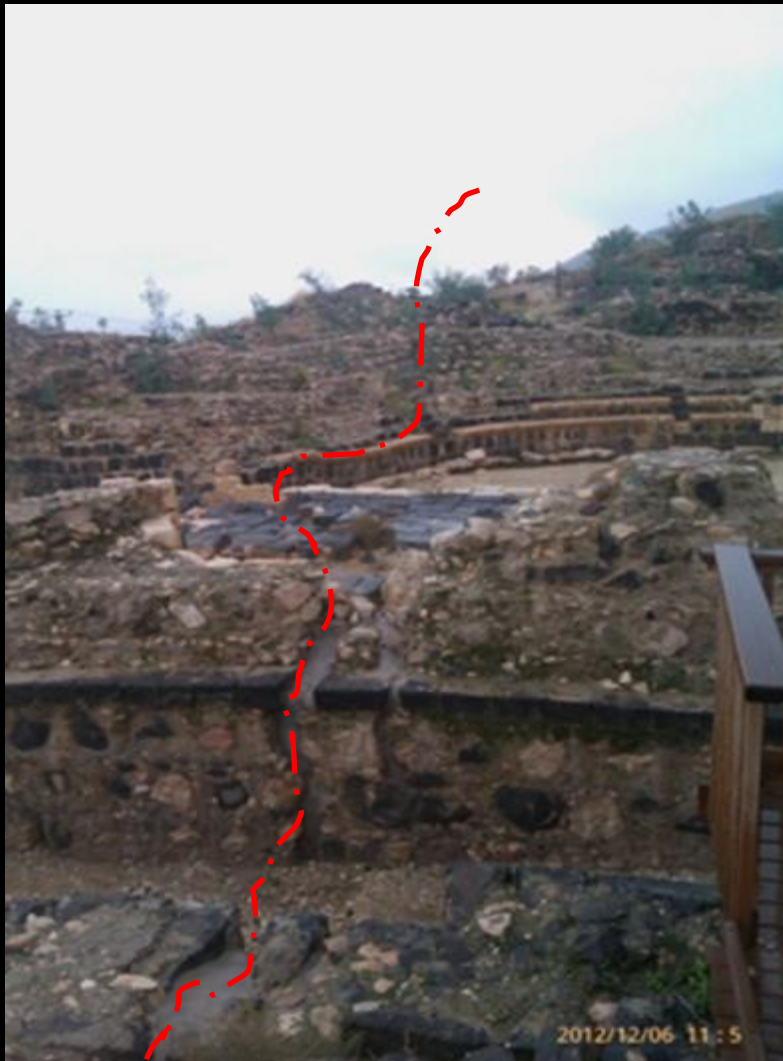
Michael Cohen, Israel Antiquities Authority Conservation Department





Jerusalem 1927





The Theatre in Tiberias



Kalat Nimrod fortress



Visitors





Ashqelon Cusader's Walls, National Park

Appropriate development ?



Beth She'an, National Park





Possible presentations



Beth She'an, National Park



Yechiam fortress, National Park

Outlines

1. The **process** of the Disaster Risk Reduction of Cultural Heritage in Israel
2. Risk Map to Cultural Heritage - **Methodology**
3. Thinkable **implementation**



MINISTERO
PER I BENI
E LE ATTIVITÀ
CULTURALI



MINISTRY OF FOREIGN AFFAIRS
JERUSALEM



Second UNESCO World Heritage workshop on 'Disaster Risk Reduction to Cultural Heritage'

14-17 November 2009, Acre, Israel



RITS



Second UNESCO World Heritage Workshop on:



Risk Preparedness for Culture Heritage in ISRAEL

- Establishing Steering Committee for Risk Preparedness to CH
 - The Inter-Ministerial Steering Committee for Earthquake Preparedness



Membership

- Israel National Commission for UNESCO
- The Geological Survey of Israel
- Israel Antiquities Authority
- Society for the Preservation of Israel Heritage Sites
- Nature and Parks Authority
- Bezalel Academy, Jerusalem
- Ben Gurion University in the Negev – Beer Sheva



Benefits expected from Risk Map

- Management tool for decision-makers based on knowledge
- Priorities for action
- Coordination among key players based on common updated database about conservation state and threats
- Awareness of decision-makers, professionals and the public
- Base for a guidelines for risk preparedness

before natural threats



Deterioration



Development



Tura'n



Migdal

Lack of Maintenance



Tel Lachish

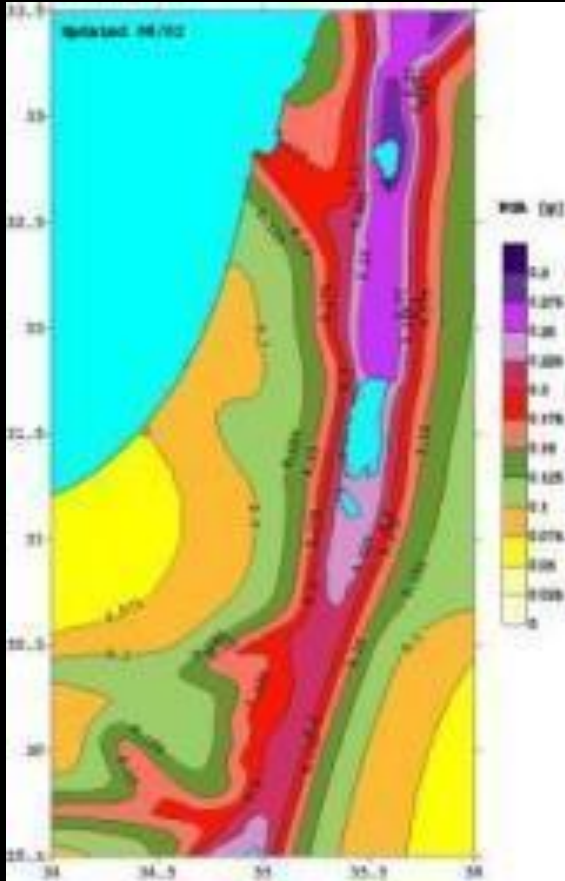


Tel Gezer



3 Parameters for Selecting Sites.

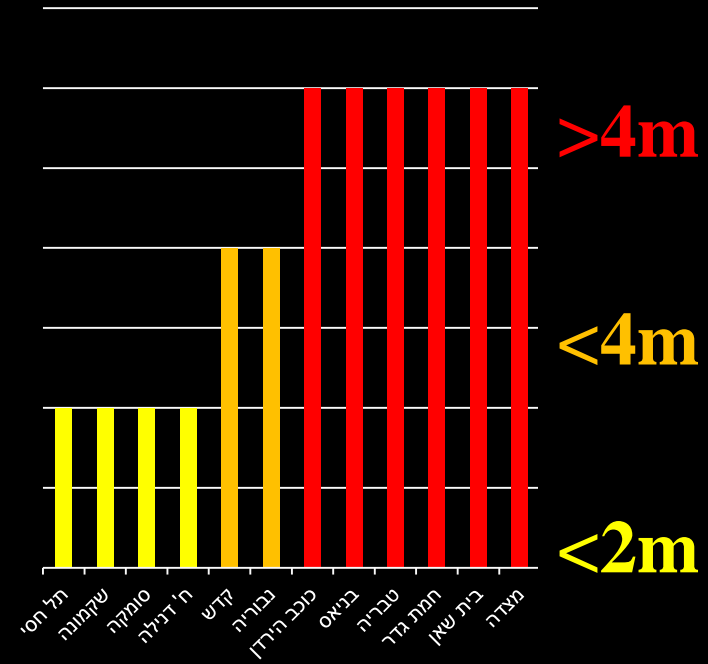
1
Seismic danger



2
Value/important



3
Height



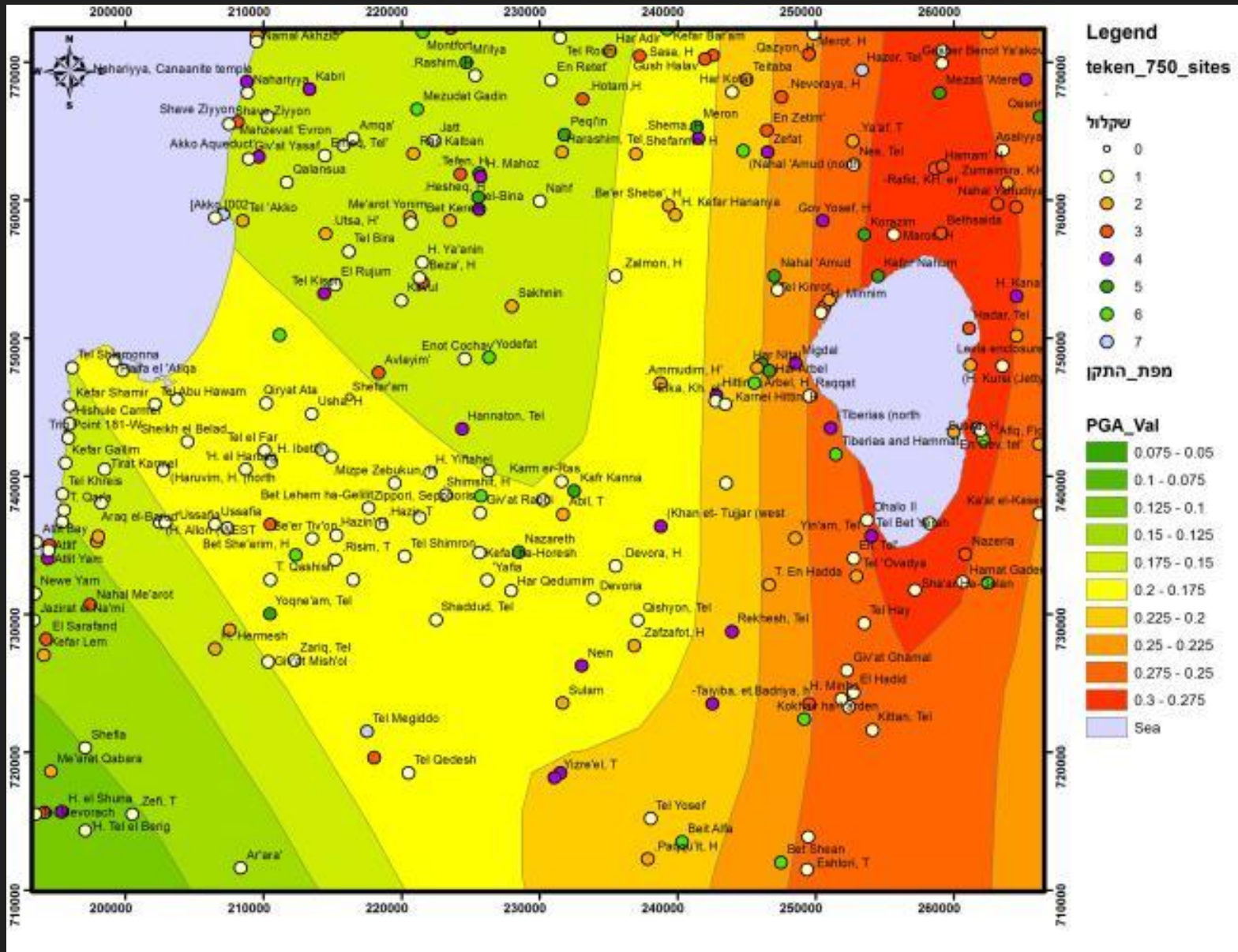


Final results of sites evaluation according the 3 parameters: Location, Value/important, Height

Score	Seismic Location	Value	Height	NY	NX	SY	SX	NAME	שם	תת אתר	ATA_ID	Site No
12	4	5	3	5820	2350	5790	2330	Masada (3201/0)	חרבות מצדה (3201/0)	0	3201	3201/0
12	4	5	3	7702	2542	7686	2525	Hazor, T. (3757/0)	חצור, תל (3757/0)	0	3757	3757/0
11	3	5	3	7604	2089	7580	2064	Acre (2266/0)	עכו (2266/0)	0	2266	2266/0
11	3	5	3	7220	2180	7210	2170	Megiddo, T. (2723/0)	מגידו, תל (2723/0)	0	2723	2723/0
11	4	4	3	7140	2410	7130	2400	Bet Alfa (3338/0)	בית אלפא (3338/0)	0	3338	3338/0
11	4	4	3	7470	2459	7465	2452	Arbel, H. (3482/0)	ארבל, ח' (3482/0)	0	3482	3482/0
11	4	4	3	7130	2490	7110	2460	Bet She'an (3537/0)	בית שאן (3537/0)	0	3537	3537/0
11	4	4	3	7230	2500	7220	2490	Belvoir (3612/0)	כוכב הירדן (3612/0)	0	3612	3612/0
11	4	4	3	7953	2656	7940	2633	Panias, H. (3945/0)	פאניס, ח' (3945/0)	0	3945	3945/0
11	4	4	3	7956	2673	7952	2668	Mivzar Nimrod (4007/0)	מבצר נמרוד (4007/0)	0	4007	4007/0
11	4	4	3	7643	2453	7623	2444	Nahal `Amud (north) (29563/0)	נחל עמוד (צפון) (29563/0)	0	29563	29563/0
10	3	4	3	7510	2110	7490	2100	Afeq, T. (2425/0)	אפק, תל (2425/0)	0	2425	2425/0
10	3	4	3	7666	2212	7665	2210	Mezudat Yehi`am (Unofficial name) (2899/0)	מצודת גדין (2899/0)	0	2899	2899/0
10	3	4	3	7722	2216	7721	2214	Montfort (2901/0)	מונפור (2901/0)	0	2901	2901/0
10	2	5	3	6340	2237	6296	2213	Jerusalem, Old City (2921/0)	ירושלים, העיר העתיקה (2921/0)	0	2921	2921/0
10	3	4	3	7490	2270	7480	2260	Yodefata (3040/0)	יודפת (3040/0)	0	3040	3040/0



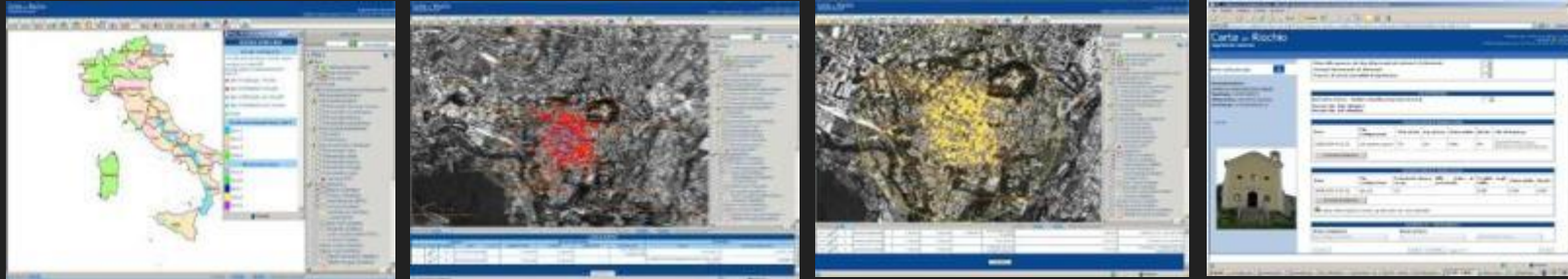
Selected sites (Based on the 750 sites list)



Evaluation of a single Structure



Khan Kiri, Yokneam



PRINCIPLES for our **RISK MAP**

SIMPLE - simplified model, open to upgrade

SUPPORT - by external expertise (Padova Uni. Italy, Niker project)

KNOWN CRITERIA - existing parameters

WIDESPREAD - collaboration with key players

SUSTAINABLE - based on internal sources / capacities



Earthquake and Archaeological Sites

Development Risk Assessment Model

VULNERABILITY

X

HAZARD

= RISK

Engineering - conservation state
Physical conservation state

Faults
Topography amplification
Slope stability
Liquidity
Tsunami

$$V \times H = Risk$$

Critical (450 -)

High (300-450)

Medium (150-300)

stable (0-150)

Risk Evaluation Form



Risk Map - Structure Card												
Date												
Site												
Name of the Building/complex												
Reference												
Site serial number												
Fill duration in minutes												
Type of the edifice remains				not calculated			Structure, Complex, Part of complex, Colonnade					
Materials				Concrete, Basalt, Lime stone, Sand stone, Other								
Mortar				Lime, Cement, Mud, Epoxy								
Technology				One leaf, two leaves, three leaves, colonnade								
Integrity				3D connections								
Elevation				0			Multiplicity					
Height (absolute)				0 3 2 1			High ----- Low			3) more than 4m - 2) 2-4m - 1) up to 2m		
Engineering and conservation state				0			Automatic					
Collapse				0 4 3 2 1			yes ----- no			Existence of collapse that endanger the Structure		
Dismantled				0 4 3 2 1			yes ----- no			Existence of dismantling of structural element that endanger the Structure		
3D connections				0 4 3 2 1			yes ----- no			No existence of 3D connections of structural element that stabilize the Structure		
Vaults arches				0 4 3 2 1			yes ----- no			No exist		
Deformations				0 4 3 2 1			yes ----- no			Existen		
Verticals or Horizontals Cracks				0 4 3 2 1			yes ----- no			Existen		
Adjacent constructions				0 4 3 2 1			yes ----- no			Adjace		
Modern intervention				0 4 3 2 1			yes ----- no			Moder		
Physical- conservation state				0			Automatic					
Lacking bricks/blocks/mortar/element				0 4 3 2 1			yes ----- no			Lacking		
Deterioration				0 4 3 2 1			yes ----- no			Deterio		
Vegetation				0 4 3 2 1			yes ----- no			Vegeta		
Vulnerability				0			Automatic					
Conclusion												
General conclusion												
Detail Conclusion												
Recommendation												
General												
Details												
Free words												
Hazard												
Faults				1 4 3 2 1								
Topography Amplification				0 4 3 2 1								
Slope stability				1 4 3 2 1								
Liquidation				0 4 3 2 1								
Tsunami				0 4 3 2 1								
Dangers							Automatic					
Risk Score							Automatic					
Critical							Endang					
High							Active					
Medium							Bad co					
Stable							Stable Condition					
Engineer Applicant												
Geological Applicant												
Appendix												



Engineering and conservation state

	No	-	Yes	Σ	
instability of constructive elements which endanger the structure	1	2	3	4	0
Lack of constructive elements which endanger the Structure (beam/ vault/ arch/ pillar)	1	2	3	4	0
Lack of 3D connections between constructive elements (foundations / walls/ roof/ ceiling/ columns)	1	2	3	4	0
Slenderness (the proportion between the tall and wide) 1) 1: 4 / 2) 1:6 / 3) 1:8 / 4) 1:10	1	2	3	4	0
Existence of deformation (sinks, blows, attitude) that can endanger the stability of the structure	1	2	3	4	0
Existence of vertical / horizontal / diagonal constructive cracks that endanger the stability of the structure					
Adjacent construction that endanger the structure					4 0
Modern intervention that endanger the stability of the structure					4 0
					0

Physical - conservation state

Lacking bricks/blocks/mortar/element	Lacking of elements the endanger the structure				4	0
Deterioration	Deterioration that endanger the structure				4	0
Vegetation	Vegetation that endanger the stabilizing				4	0
						0

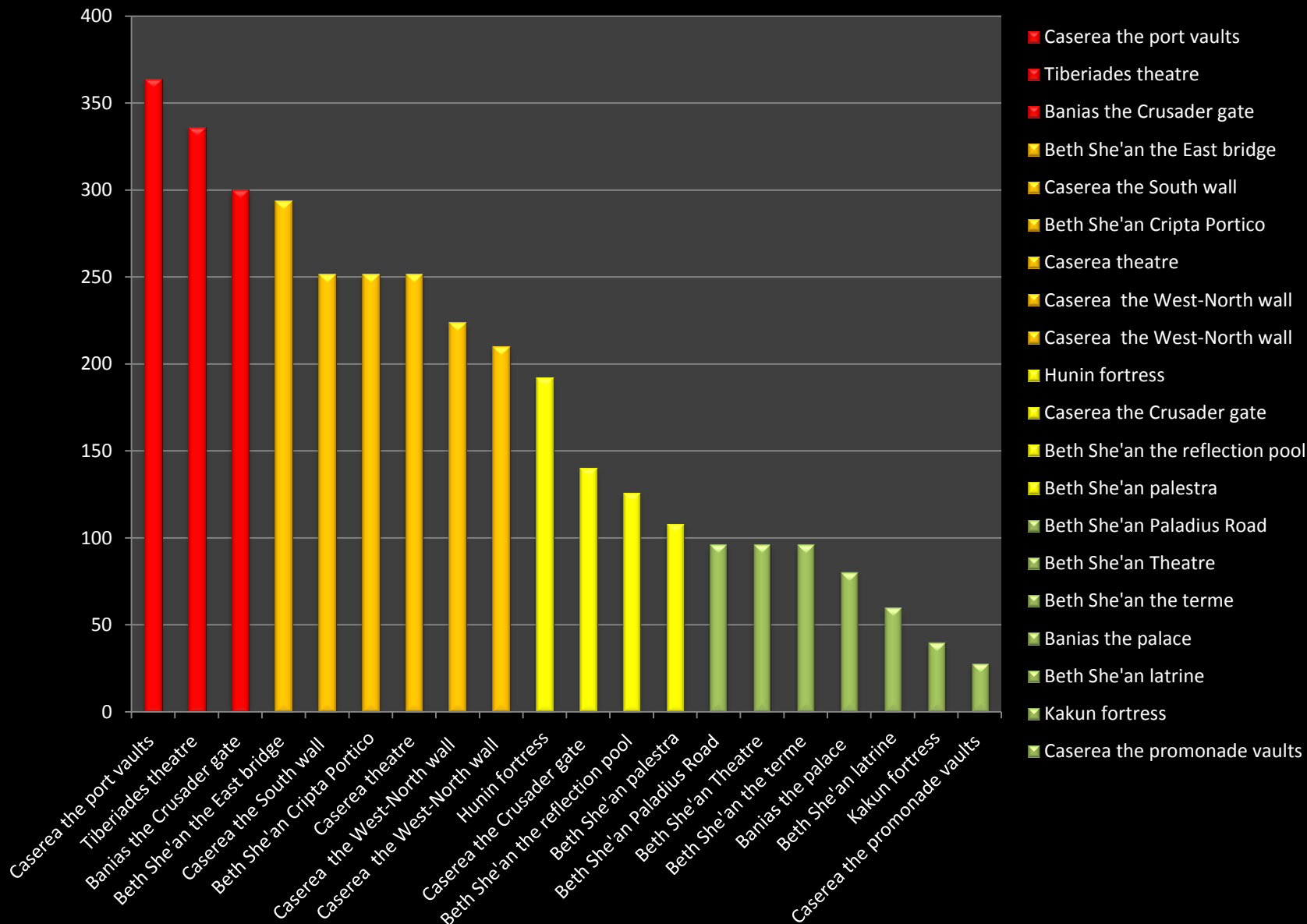


Engineering and conservation state

	No	-	Yes	Σ	
instability of constructive elements which endanger the structure	1	2	3	4	0
Lack of constructive elements which endanger the Structure (beam/ vault/ arch/ pillar)	1	2	3	4	0
Lack of 3D connections between cons					0
Slenderness (the proportion between					0
Existence of deformation (sinks, blow					0
Existence of vertical / horizontal / dia					0
structure					0
Adjacent construction that endanger					0
Modern intervention that endanger t					0
					0
					0
Physical - conservation state					
Lacking bricks/blocks/mortar/elemen					0
Deterioration					0
Vegetation					0
vegetation that endanger the stabilizing of the structure	1	2	3	4	0
	Total				0



Preliminary Risk Assessment results of Archaeological Sites - Pilot (2011-12)



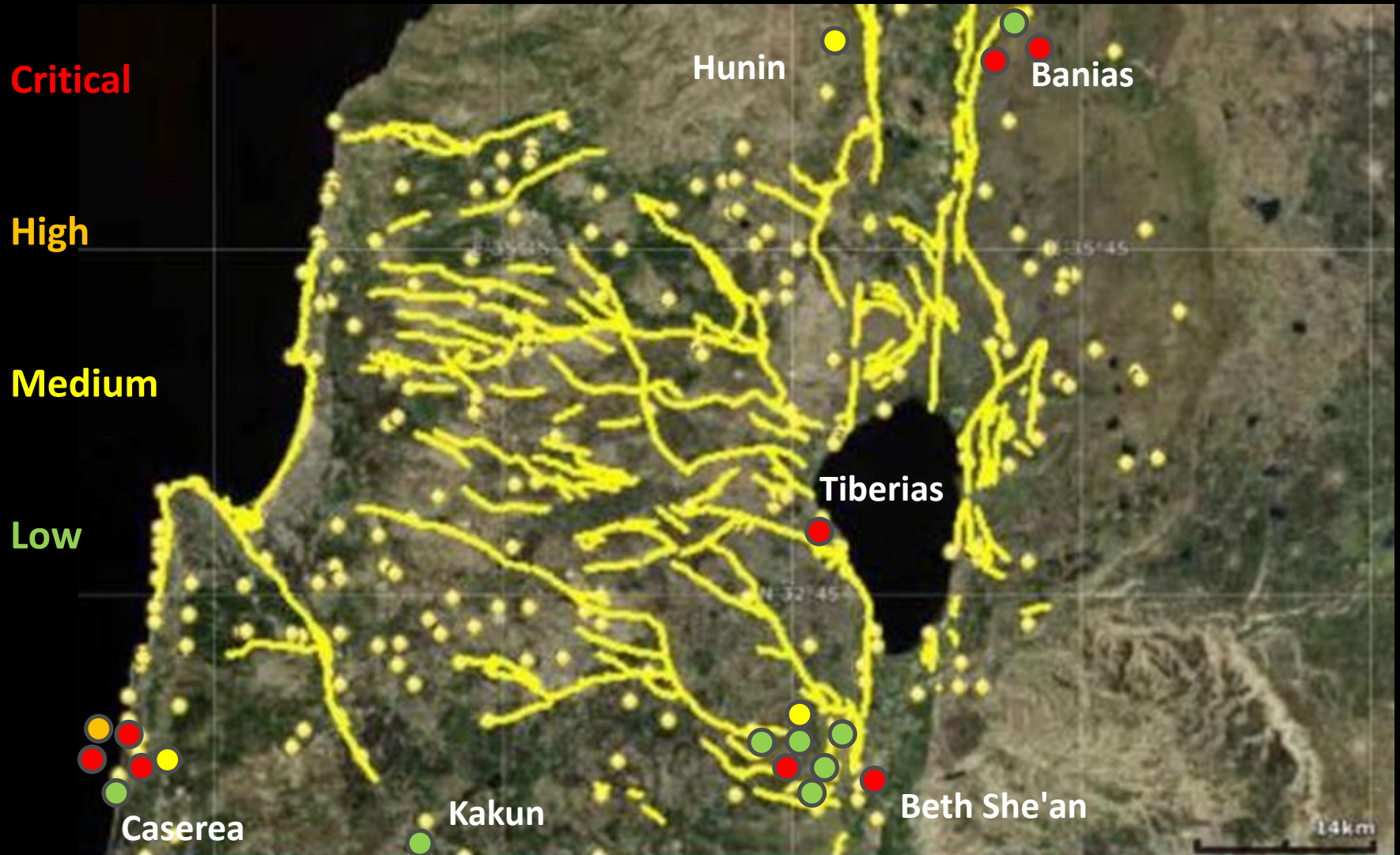
Critical

High

Medium

Low

Preliminary pilot results – risk assessment of CH structures

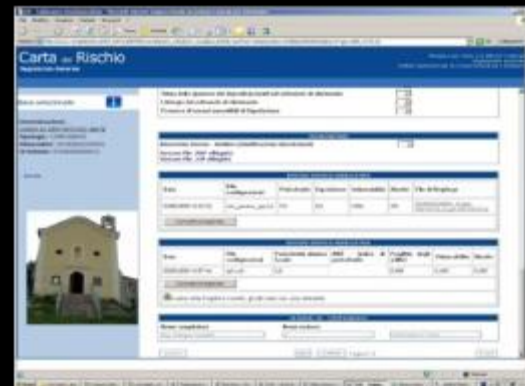
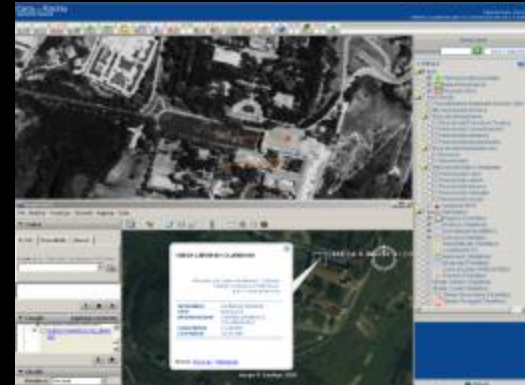
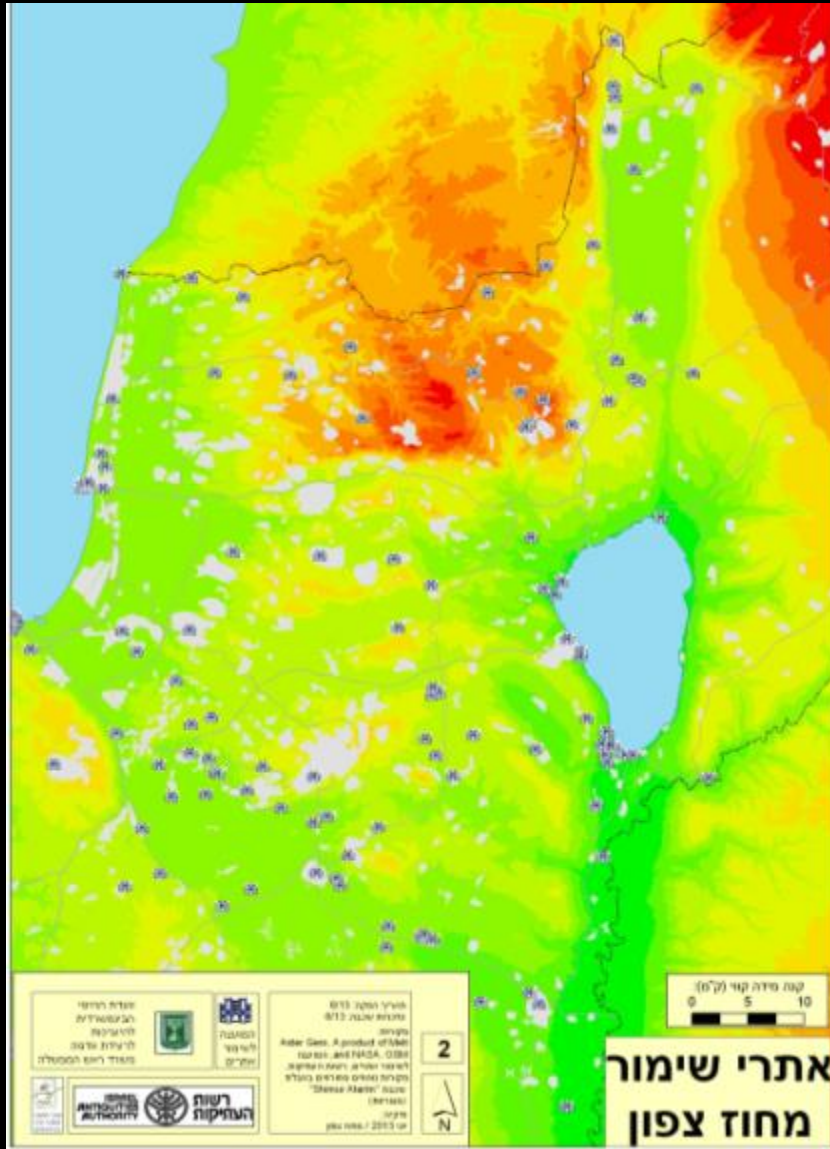




Preliminary Conclusions – Archaeological sites

- Seismic Risk preparedness on sites was **neglected** until today even in visited sites
- **Positive experience of a simple model for Risk map**
- The results are validated
- **Structures that were submitted to conservation are usually in good state**

Earthquakes and Historical Sites



Seismic vulnerability assessment on an urban scale



Identification of the blocks





Thinkable solutions for Risk Preparedness

- Information sharing (GIS)
- Supplementary investigations
- Closing / isolating structures
- Monitoring/Alarm systems
- Reinforcing / strengthening
- Guideline procedures
- Training professionals



**on Park,
on Mauleverer with Hopperton**
ered Park and Garden Grade II,
9 LBs
ally unsatisfactory
hajor localised problems
m
ing
e, multiple owners

Mid C19 terraced gardens which provide the setting for a country house, surrounded by parkland which was englanded in the 1720s and reworked in the 1770s. C20 woodland planting has significantly changed the character of the historic landscape and a number of listed structures are in poor condition.

Afek

Contact: Andy Wimble 01904 601970



**on Castle,
on with Warthermarske**
ered Park and Garden Grade II*,
LBs
ally satisfactory
with significant localised problems
m
ing
e, single owner

Gardens and extensive pleasure grounds with grottos, rustic bridges and rockwork laid out from 1796 to c1820 under the direction of Adam Mickle the second and others for Sir William Danby, incorporating lakes and landscaping of c1760. The park probably has C17 or earlier origins. Significant proportion of the tree cover has reached maturity and beyond, some structures in poor condition and water bottles in Quarry Gill woods heavily silted.

Apollonia

Contact: Andy Wimble 01904 601970



**of Boroughbridge,
ghbridge / Langthorpe / Milby**
ered Battlefield
ally satisfactory
with significant localised problems
m
ing
e

Thomas Earl of Lancaster's 1322 revolt against Edward II ended with defeat as his army attempted to retreat north and cross the River Ure. Much of the battlefield lies under modern Boroughbridge; further expansion is possible north of the river.

Beth Guvrin

Contact: Keith Emerick 01904 601988

PRIORITY (FOR BUILDINGS)

- A Immediate risk of further rapid deterioration or loss of fabric; no solution agreed.
- B Immediate risk of further rapid deterioration or loss of fabric; solution agreed but not yet implemented.
- C Slow decay; no solution agreed.

- D Slow decay; solution agreed but not yet implemented.
- E Under repair or in fair to good repair; but no user identified; or under threat of vacancy with no obvious new user (applicable only to buildings capable of beneficial use).

- F Repair scheme in progress and (where applicable) end use or user identified; functionally redundant buildings with new use agreed but not yet implemented.

NOTE:
If the priority category has changed since the 2010 register, the previous category is given in brackets.

ABBREVIATIONS

- CA Conservation Area
- LB/LBs Listed Building/s
- LPA Local Planning Authority
- NP National Park
- RPG Registered Park and Garden
- SM/SMs Scheduled Monument/s
- UA Unitary Authority
- WHS World Heritage Site



Engineer's Seminar
Historic Buildings and Earthquakes
 11-12 December 2011 Mikveh Israel

NIKER Workshop - Historic buildings and Earthquakes
 Mikveh Israel, Tel Aviv, The International Conservation Center "Città di Roma" Acre
 16-17 December 2012 ג'ד" טבת תשע"ב

סדנת סיכום פרויקט ניקר - מבנים היסטוריים ורעידות אדמה
 המועצה לשימור אתרי מורשת בישראל, 'בית המורים' ביי"ם החקלאי מקוה ישראל
 מרכז השימור הבינלאומי ע"ש העיר רומא עכו.

סדנא בין-לאומית

International Workshop



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 Israel, Jerusalem. 19-20 January 2014

BOOM!

CRITICAL HIGH

MEDIUM

STABLE

WHAT WAS THAT?

THANKS

FOR YOUR ATTENTION

⌘

