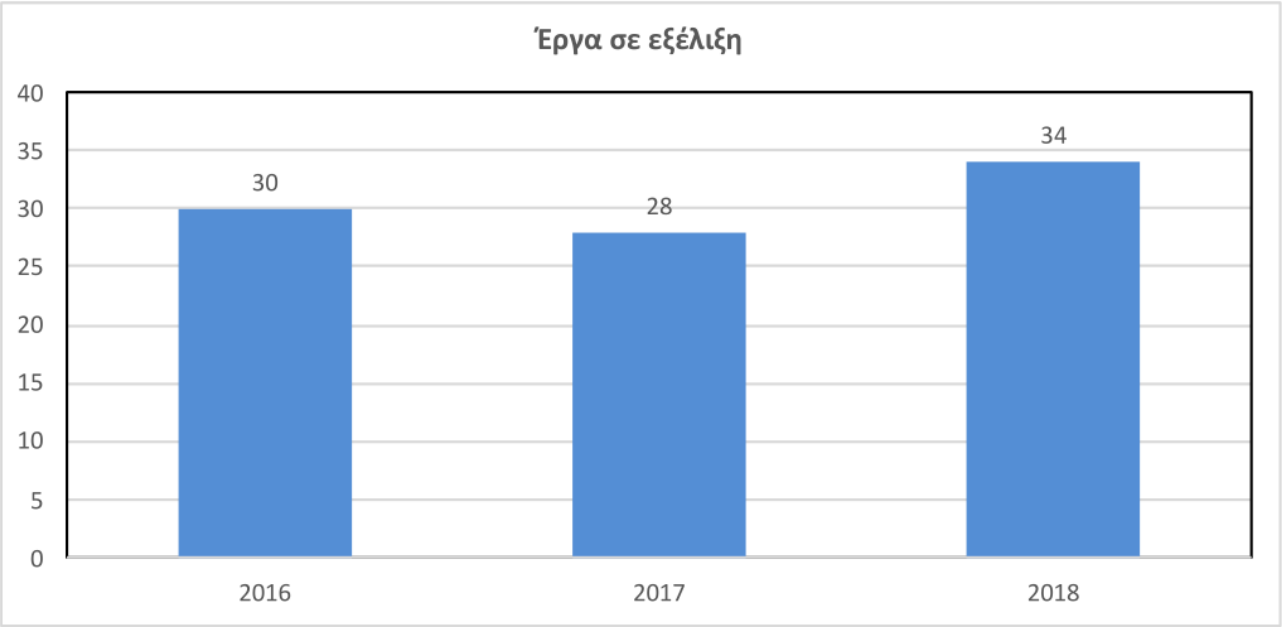
ΑΠΟΤΙΜΗΣΗ
ΕΡΕΥΝΗΤΙΚΟΥ ΕΡΓΟΥ

ΙΝΣΤΙΤΟΥΤΟΥ ΕΔΑΦΟΫΔΑΤΙΚΩΝ ΠΟΡΩΝ (ΙΕΥΠ)

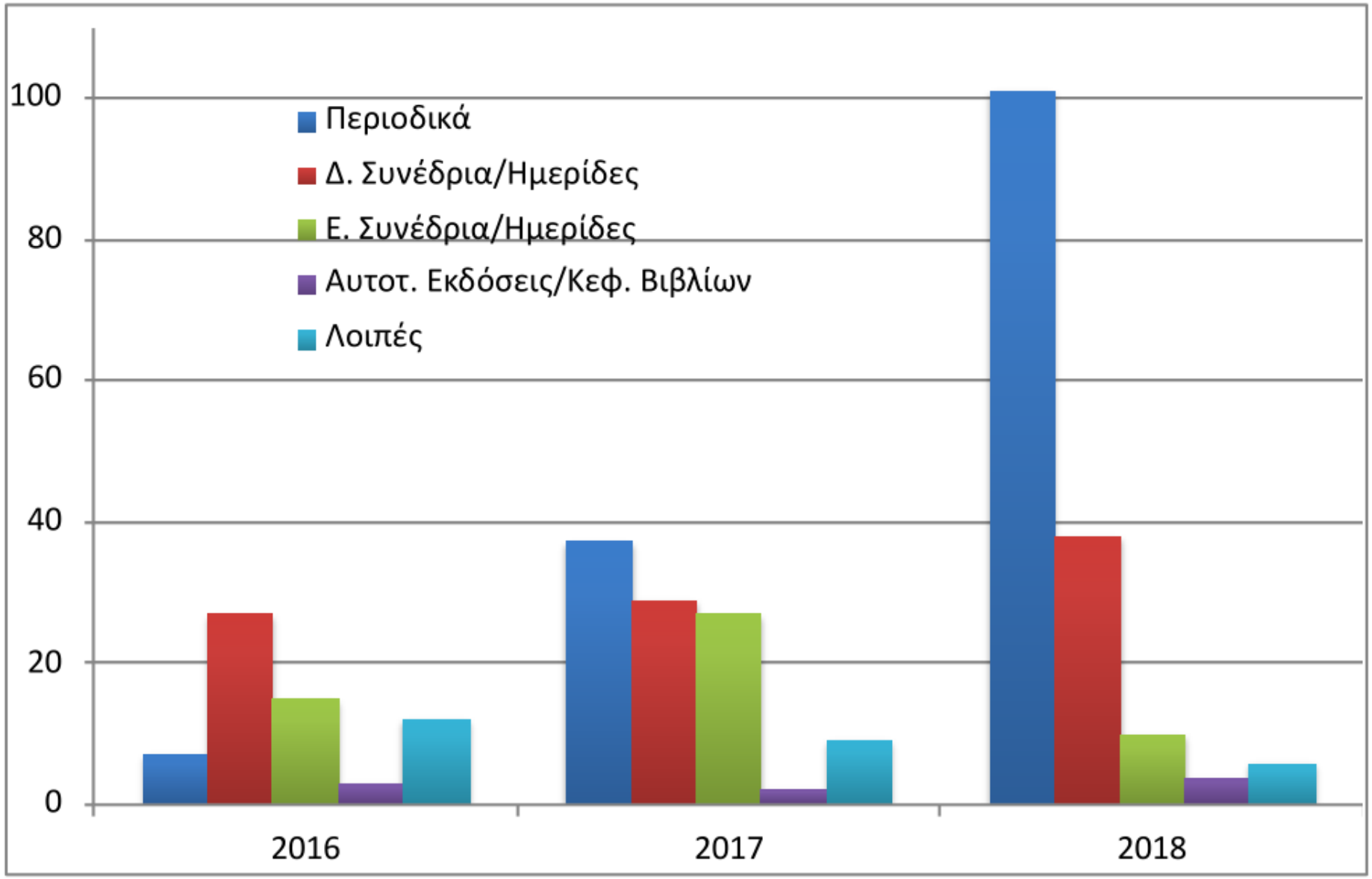
2016-2018

ΜΕ ΜΙΑ ΜΑΤΙΑ

Αριθμός έργων ανά έτος εκκίνησης της υλοποίησής τους (αφορά έργα που εξακολούθησε η υλοποίησή τους εντός της εξεταζόμενης περιόδου 2016-2018)



Αριθμός έργων που υλοποιούνται σε κάθε ένα από τα εξεταζόμενα έτη (2016-2018)



Εξέλιξη κατηγοριών δημοσιεύσεων κατά την χρονική περίοδο 2016-2018

ΑΠΟΤΙΜΗΣΗ ΕΡΕΥΝΗΤΙΚΟΥ ΕΡΓΟΥ

ΙΝΣΤΙΤΟΥΤΟΥ ΕΔΑΦΟΫΔΑΤΙΚΩΝ ΠΟΡΩΝ (ΙΕΥΠ)

2016-2018

1η έκδοση Μάρτιος 2019

Η σύνταξη του παρόντος τεύχους έγινε από τους Ερευνητές του Επιστημονικού Συμβουλίου (ΕΣΙ) του Ινστιτούτου Εδαφοϋδατικών Πόρων (ΙΕΥΠ) και αποτελεί προϊόν ανάλογης συνεργασίας του ερευνητικού του δυναμικού.

Τα μέλη του ΕΣΙ			
Αραμπατζής Γεώργιος	ερευνητής βαθμίδας Β΄	g.arampatzis@swri.gr	2310 798790 (εσωτ. 114)
Δαλαμπάκης Πασχάλης	ερευνητής βαθμίδας Β΄	p.dalampakis@swri.gr	2310 798790 (εσωτ. 118)
Παναγόπουλος Ανδρέας	ερευνητής βαθμίδας Α΄	a.panagopoulos@swri.gr	2310 798790 (εσωτ. 101)
Παπαδόπουλος Φραντζής	ερευνητής βαθμίδας Α΄	f.papadopoulos@swri.gr	2310 472160
Χατζηγιαννάκης Ευάγγελος	ερευνητής βαθμίδας Β΄	e.hatzigiannakis@swri.gr	2310 798790 (εσωτ. 111)

Το τεύχος αυτό μπορείτε να ανακτήσετε και από τον ιστότοπο του ΙΕΥΠ

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ΠΡΟΛΟΓΟΣ

Βασικός στόχος ενός ερευνητικού Ινστιτούτου είναι η παραγωγή αποτελεσμάτων, που έχουν άμεσο αντίκρισμα στην επίλυση πραγματικών προβλημάτων της κοινωνίας, συμβάλλοντας έτσι στην προαγωγή της επιστήμης και στην εξασφάλιση συνθηκών βιωσιμότητας για τον άνθρωπο και το περιβάλλον του.

Η επιτυχία μιας ερευνητικής μονάδας συνίσταται, μεταξύ των άλλων και στην υιοθέτηση των αποτελεσμάτων, από φορείς ανάλογου γνωστικού αντικειμένου, είτε ερευνητικών και αναπτυξιακών έργων είτε εξειδικευμένων υπηρεσιών. Η αποτίμηση του ερευνητικού έργου αποτελεί ένα σημαντικό εργαλείο για την αξιολόγηση του βαθμού επιτυχίας της. Η διαδικασία αυτή επιτρέπει τον εντοπισμό των αδυναμιών, με στόχο την άμβλυνσή τους, αλλά και των ισχυρών του σημείων, με σκοπό την διαφύλαξη και ενίσχυσή τους στο μέλλον.

Έχοντας υπόψη τις παραπάνω βασικές αρχές, το Επιστημονικό Συμβούλιο (ΕΣΙ) του Ινστιτούτου Εδαφοϋδατικών Πόρων (ΙΕΥΠ) έθεσε ως προτεραιότητά του, από την πρώτη στιγμή της συγκρότησής του (τέλη του 2018), τη σύνταξη του παρόντος τεύχους, που αποτελεί μια πρώτη προσπάθεια εσωτερικής αξιολόγησής του την τελευταία τριετία.

Η προσπάθεια αυτή όμως, πέραν της παραπάνω αποτίμησης, αποτελεί και ενσυνείδητη επιλογή εξωτερίκευσης του Ινστιτούτου μας προς τον επιστημονικό κόσμο της χώρας αλλά και τους φορείς, που άμεσα ή έμμεσα σχετίζονται με τις δραστηριότητες του ΙΕΥΠ. Επιδίωξη της προσπάθειάς μας αυτής είναι αφενός μεν η ενδυνάμωση των συνεργασιών μας αφετέρου δε η δημιουργία προϋποθέσεων για νέες συνεργασίες

Σας καλούμε λοιπόν να μας γνωρίσετε και να συνεργαστείτε μαζί μας επιδιώκοντας όλοι μαζί ένα καλύτερο μέλλον για τους εδαφοϋδατικούς πόρους της χώρας μας.

Καλή ανάγνωση.

Ελληνικός Γεωργικός Οργανισμός – *Δήμητρα (ΕΛΓΟ-ΔΗΜΗΤΡΑ)*
Ινστιτούτο Εδαφοϋδατικών Πόρων (ΙΕΥΠ)

Γενική περιγραφή ΙΕΥΠ

Το ΙΕΥΠ είναι το μεγαλύτερο εξειδικευμένο Ινστιτούτο στην Ελλάδα σε θέματα προστασίας και διαχείρισης των εδαφοϋδατικών πόρων, καλύπτοντας ένα ευρύ φάσμα διαφορετικών σχετικών επιστημονικών θεμάτων.

Το ΙΕΥΠ, με έδρα τη Θέρμη Θεσσαλονίκης, μετά από συγχώνευση το 2014 τεσσάρων Ινστιτούτων, αποτελείται πλέον από 4 ερευνητικές μονάδες εκ των οποίων οι δύο βρίσκονται στη Θέρμη (πρώην Ινστιτούτο Εδαφολογίας Θεσσαλονίκης) και στη Σίνδο (πρώην Ινστιτούτο Εγγείων Βελτιώσεων) Θεσσαλονίκης και οι άλλες δύο βρίσκονται στην Αθήνα (Τμήμα Εδαφολογίας Αθηνών και Τμήμα Γεωργικής Μηχανικής).

Το τρέχον προσωπικό του Ινστιτούτου αποτελείται από 20 ερευνητές, 22 ειδικούς επιστήμονες και 21 διοικητικούς και τεχνικούς υπαλλήλους. Παράλληλα απασχολεί 25 επιστημονικούς συνεργάτες με συμβάσεις έργου στα πλαίσια προγραμμάτων έρευνας και παροχής υπηρεσιών εμπειρογνωμοσύνης.

Το ΙΕΥΠ συμμετέχει σε προγράμματα εκπαίδευσης-επιμόρφωσης νέων επιστημόνων (ATLAS, ERASMUS, etc) και στην επίβλεψη προπτυχιακών, μεταπτυχιακών και διδακτορικών διατριβών σε συνεργασία με ελληνικά και ευρωπαϊκά πανεπιστήμια.

2. Υποδομές και επιχειρησιακή ικανότητα του ΙΕΥΠ

Το ΙΕΥΠ διαθέτει 3 εργαστήρια για αναλύσεις φυσικο-χημικών παραμέτρων εδάφους, νερού, φυτικών ιστών, 1 νέο εργαστήριο αναλύσεων υγρών/στερεών αποβλήτων και βιοτεχνολογικών εφαρμογών και 1 εργαστήριο γεωργικής μηχανολογίας, το οποίο είναι το μόνο στην Ελλάδα που παρέχει επίσημες πιστοποιήσεις γεωργικών παρελκόμενων για εφαρμογές γεωργίας ακριβείας.

Το Ινστιτούτο παρέχει μία ευρεία λίστα αναλύσεων με διαπίστευση ISO 17025, καθώς και άλλες με ISO 9001.

Διαθέτει 100 ιδιόκτητα στρέμματα πειραματικών αγρών, στόλο 9 οχημάτων (εκ των οποίων 3 παντός εδάφους), μία βάρκα 5 μέτρων για επιχειρήσεις σε υδάτινα περιβάλλοντα, εγκατεστημένους μετεωρολογικούς σταθμούς, 5 λυσίμετρα εξατμισοδιαπνοής, 3 θερμοκήπια, και ένα από τα μεγαλύτερα φυσικά συστήματα τεχνητών υγροτόπων για επεξεργασία υγρών αποβλήτων στην Ελλάδα για πειραματικούς σκοπούς.

Το ΙΕΥΠ συμμετέχει στη λειτουργία του Υδρολογικού Παρατηρητηρίου του ποταμού Πηνειού σε συνεργασία με το Forschungszentrum Jülich, το οποίο είναι μέλος του εθνικού και παγκόσμιου δικτύου Μακροχρόνιας Έρευνας Οικοσυστημάτων (Long-Term Ecosystem Research - LTER). Τέλος, το Ινστιτούτο εποπτεύει 2 τελευταίας γενιάς σταθμούς παρατήρησης στον ποταμό Αλιάκμονα.

Το ΙΕΥΠ είναι ιδιαίτερα ευέλικτο στην διεξαγωγή πειραμάτων εργαστηρίου και πιλοτικών εφαρμογών στο πεδίο. Επίσης, μπορεί να διεξάγει μεγάλης κλίμακας έρευνες ακόμα και σε εθνικό επίπεδο καθώς έχει αναπτύξει εδαφολογικούς χάρτες για μεγάλο μέρος των γεωργικών εκτάσεων σε εθνικό επίπεδο, ενώ είναι ο αρμόδιος φορέας υλοποίησης του Εθνικού Δικτύου Παρακολούθησης και καταγραφής της ποσότητας (ποτάμια) και ποιοότητας (ποτάμια και λίμνες)των επιφανειακών υδάτων της χώρας (Οδηγία 2000/60/ΕΚ).

3. Αντικείμενα έρευνας

Οι ερευνητικές δραστηριότητες του ΙΕΥΠ καλύπτουν τις κάτωθι θεματολογίες:

3.1 Νερό

- Σχεδιασμός αρδευτικών και στραγγιστικών δικτύων
- Τεχνολογίες άρδευσης, διαχείριση και βελτιστοποίηση χρήσης αρδευτικού νερού
- Υδροδυναμική υδραυλικών κατασκευών
- Ανάλυση πλημμυρικών φαινομένων και διάβρωσης
- Υδρολογία υπόγειων υδάτων
- Ανάπτυξη και βελτιστοποίηση συστημάτων τεχνητής επαναπλήρωσης υπόγειων υδάτων
- Γεωθερμική ενέργεια και αντλίες θερμότητας
- Υδρογεωχημεία
- Συστήματα παρακολούθησης υδάτινων πόρων
- Κλιματολογία, αγρομετεωρολογία και κλιματική αλλαγή
- Οικολογικοί δείκτες και χαρακτηρισμός της ποιοτικής κατάστασης γλυκών υδάτων
- Οικοσυστημικές υπηρεσίες γλυκών υδάτων

3.2 Έδαφος και φυτό

- Φυσική και χημεία εδάφους
- Μικροβιολογία εδάφους, ένζυμα και νηματώδεις
- Πεδολογία, κατηγοριοποίηση, αξιολόγηση και χαρτογράφηση εδαφών

- Εκτίμηση της ρύπανσης και υποβάθμισης του εδάφους (διάβρωση, ερημοποίηση, εξάντληση της οργανικής ουσία, αλάτωση, νατρίωση και μείωση βιοποικιλότητας) και αποκατάσταση
- Βιοχημικοί κύκλοι σε γεωργικά και δασικά οικοσυστήματα
- Γονιμότητα εδάφους και θρέψη φυτού (including modeling fertilization requirements for more than 60 crops)
- Stress effects of abiotic environmental factors on plant physiology

3.3 Αστικά και γεωργικά απόβλητα

- Ανάλυση υγρών και στερεών αποβλήτων
- Φυσικά συστήματα επεξεργασίας λυμάτων
- Διαχείριση και χρήση επεξεργασμένου νερού και λυμάτων στη γεωργία
- Βιοτεχνολογικές μέθοδοι επεξεργασίας και αξιοποίησης αποβλήτων
- Παραγωγή βιοενέργειας και βιο-προϊόντων από αγρο-βιομηχανικά απόβλητα
- Χρήση αποβλήτων σε πρακτικές κυκλικής οικονομίας στην γεωργία

3.4 Γεωργική μηχανική και νέες τεχνολογίες στη γεωργία

- Συστήματα Γεωγραφικών Πληροφοριών, γεωστατιστική και γεωβάσεις
- Τηλεπισκόπηση και τεχνολογίες Γεωργίας Ακριβείας
- Ανάλυση κύκλου ζωής (LCA) και βιωσιμότητας (SA)
- Γεωργία ελεγχόμενου περιβάλλοντος
- Εκμηχάνιση της γεωργίας
- Τεχνολογίες πληροφορικής και επικοινωνιών (ICT) στην γεωργία (έξυπνη γεωργία, εφαρμογές IoT, δίκτυα τηλεμετρικών σταθμών, farmbots, αυτόνομα οχήματα, συστήματα τεχνητής νοημοσύνης, machine learning, εφαρμογές για κινητά, τεχνολογίες επεξεργασίας και ανάλυσης εικόνων)

ΠΙΝΑΚΑΣ 1^{A}: Κατανομή προσωπικού σε όλο το ΙΕΥΠ (01/01/2019)

ΚΑΤΗΓΟΡΙΑ	ΣΥΝΟΛΟ ΠΡΟΣΩΠΙΚΟΥ (ποσοστό %)	ΕΥΡΟΣ ΗΛΙΚΑΣ			ΒΑΘΜΙΔΕΣ ΕΡΕΥΝΗΤΩΝ			
		39-50	51-60	61-67	Α΄	Β΄	Γ΄	Δ΄
ΕΡΕΥΝΗΤΕΣ	**20 (32%)**	13	4	3	5	3	2	10
Πανεπ. Εκπαίδ. **ΠΕ** Κάτοχοι **μεταπτυχιακού** MSc	**7 (11%)**	3	4	0				
Πανεπιστημιακής & Τεχνολογικής Εκπαιδ. **ΠΕ & ΤΕ**	**15 (24%)**	3	11	1				
Δευτεροβάθμιας Εκπαιδ. **ΔΕ**	**18 (29%)**	13	3	2				
Υποχρεωτικής Εκπαιδ. **ΥΕ**	**3 (4%)**	0	3	0				
ΣΥΝΟΛΟ	**63 (100%)**	32	25	6				

ΠΙΝΑΚΑΣ 1^{B}:Κατανομή προσωπικού ΙΕΥΠ ανά γεωγραφ. μονάδα (01.01.2019)

ΚΑΤΗΓΟΡΙΑ	ΘΕΣΣΑΛΟΝΙΚΗ		ΑΘΗΝΑ		ΣΥΝΟΛΟ
	ΘΕΡΜΗ (Έδρα) www.ssi.swri.gr	ΣΙΝΔΟΣ www.lri.swri.gr	ΤΜΗΜΑ ΕΔΑΦΟΛΟΓΙΑΣ (Λυκόβρυση) www.soilscience.gr	ΤΜΗΜΑ ΓΕΩΡΓ. ΜΗΧΑΝΙΚΗΣ (Αγ. Ανάργυροι) www.agreng.swri.gr	
	WWW.SWRI.GR				
ΕΡΕΥΝΗΤΕΣ	7	7	5	1	**20**
ΠΕ μεταπτυχιακού MSc	1	3	1	2	**7**
Πανεπιστ.& Τεχνολ. εκπαιδ. **ΠΕ & ΤΕ**	6	2	6	1	**15**
Δευτεροβάθμιας Εκπαιδ. **ΔΕ**	5	4	6	3	**18**
Υποχρεωτικής Εκπαιδ. **ΥΕ**	0	2	1	0	**2**
ΣΥΝΟΛΟ	19	18	19	7	**63**

Στο Παράρτημα Α παρουσιάζεται αναλυτικά το προσωπικό του ΙΕΥΠ / μονάδα.

ΠΙΝΑΚΑΣ 2: Υλοποιηθέντα ερευνητικά προγράμματα, έργα, μελέτες, κ.λ.π. χρηματοδοτούμενα από τρίτους, που έληξαν ή συνεχίζονται από το 2016 και εντεύθεν.

Θεματική ενότητα	Αριθμός	Συνολικός προϋπολογισμός	Προϋπολογισμός ΙΕΥΠ
Γονιμότητα εδαφών, Θρέψη - Φυσιολογία φυτών	**35**	10.793.418 €	1.420.085 €
Διαχείριση υδατικών πόρων	**11**	12.809.386 €	8.590.078 €
Ρύπανση εδαφών - νερού	**8**	2.532.228 €	1.090.972 €
Γεωθερμία	**2**	43.400,00	43.400,00
Γεωργική Μηχανική	**6**	1.682.534 €	1.129.832 €
ΣΥΝΟΛΟ	**62**	**27.860.966 €**	**12.274.367 €**

Στο Παράρτημα Β παρουσιάζονται αναλυτικά τα παραπάνω υλοποιηθέντα ερευνητικά προγράμματα, έργα, μελέτες, κ.λ.π.

ΠΙΝΑΚΑΣ 3: Υποβληθείσες τα τέλη του 2018 προτάσεις ΙΕΥΠ στο ΜΕΤΡΟ 16 «ΣΥΝΕΡΓΑΣΙΑ», καθώς και λοιπές υποβληθείσες προτάσεις ερευνητικών έργων κατά την τελευταία 2ετία (2017-2018)

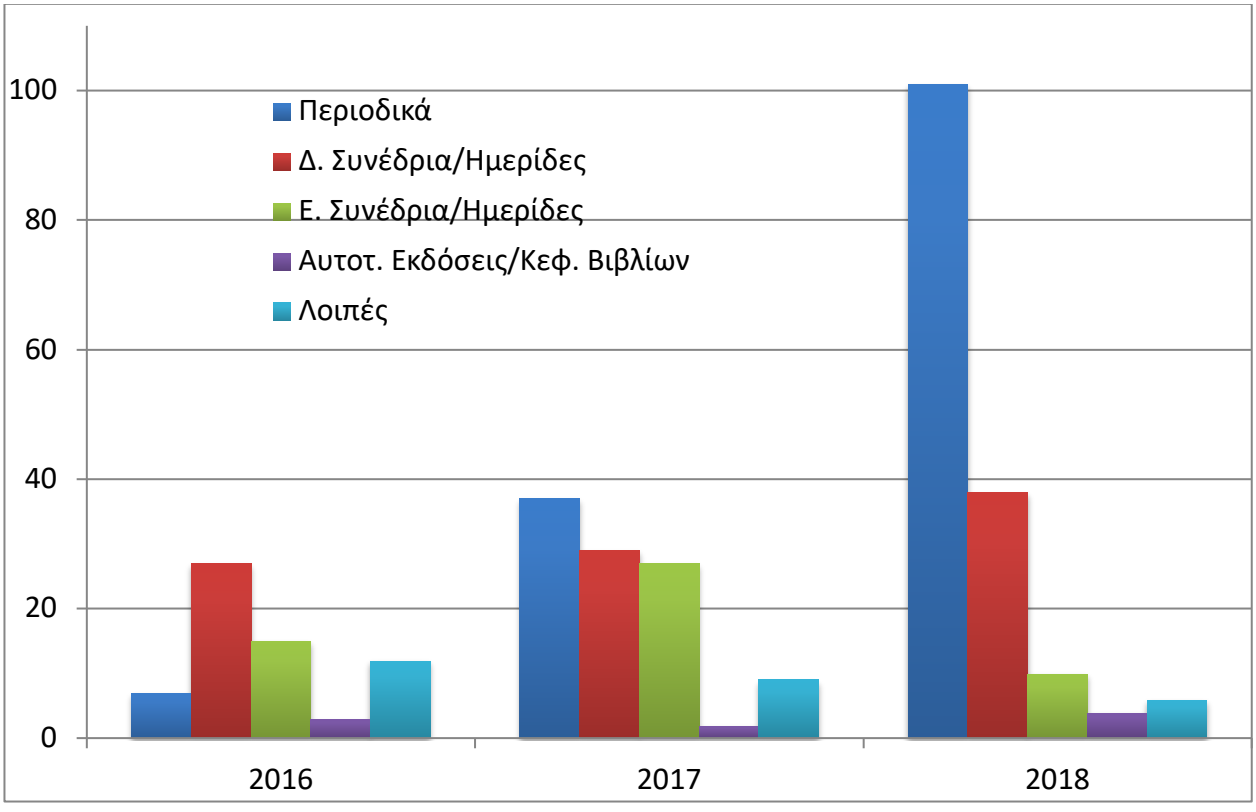
Υποβληθείσες (2018) προτάσεις ΜΕΤΡΟΥ 16 «ΣΥΝΕΡΓΑΣΙΑ» ΠΑΑ (2018)	**ΑΡΙΘΜΟΣ**
Υποβολή προτάσεων ως Συντονιστής	21
Συμμετοχή σε προτάσεις ως Φορέας	33
ΣΥΝΟΛΟ	**54**
Λοιπές υποβληθείσες προτάσεις ερευνητικών έργων κατά την τελευταία 2ετία (2017-2018)	**23**
ΓΕΝΙΚΟ ΣΥΝΟΛΟ	**77**

Στο Παράρτημα Γ παρουσιάζονται αναλυτικά οι παραπάνω υποβληθείσες προτάσεις.

ΠΙΝΑΚΑΣ 4: Δημοσιεύσεις ΙΕΥΠ τελευταίας τριετίας (2016 – 2018).

ΚΑΤΗΓΟΡΙΑ	ΑΡΙΘΜΟΣ
ΔΙΕΘΝΗ ΠΕΡΙΟΔΙΚΑ	115
ΔΙΕΘΝΗ ΣΥΝΕΔΡΙΑ - ΗΜΕΡΙΔΕΣ	74
ΕΘΝΙΚΑ ΣΥΝΕΔΡΙΑ - ΗΜΕΡΙΔΕΣ	52
ΒΙΒΛΙΑ – ΚΕΦΑΛΑΙΑ ΒΙΒΛΙΩΝ	9
ΕΚΛΑΪΚΕΥΜΕΝΑ ΠΕΡΙΟΔΙΚΑ - ΤΥΠΟΣ	27
ΣΥΝΟΛΟ	**277**

Στο Παράρτημα Δ παρουσιάζονται αναλυτικά οι δημοσιεύσεις, καθώς και οι περιλήψεις στα διεθνή περιοδικά.



Εξέλιξη κατηγοριών δημοσιεύσεων κατά την χρονική περίοδο 2016-2018

ΠΑΡΑΡΤΗΜΑ Α

Προσωπικό που υπηρετεί στις 4 ερευνητικές μονάδες του ΙΕΥΠ την 01/01/2019

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ΘΕΡΜΗ www.ssi.swri.gr 01/01/2019			
Α/Α	**ΟΝΟΜΑΤΕΠΩΝΥΜΟ**	**ΙΔΙΟΤΗΤΑ**	**ΕΙΔΙΚΟΤΗΤΑ / ΘΕΣΗ ΕΡΓΑΣΙΑΣ**
1	ΠΑΠΑΔΟΠΟΥΛΟΣ Α.	ΕΡΕΥΝΗΤΗΣ Α	Γεωπόνος /Έγγειες Βελτιώσεις/ ΔΙΕΥΘΥΝΤΗΣ
2	ΠΑΠΑΔΟΠΟΥΛΟΣ Φ	ΕΡΕΥΝΗΤΗΣ Α	Γεωπόνος/ Έγγειες Βελτιώσεις / ΠΡΟΕΔΡΟΣ ΕΣΙ
3	ΤΖΙΑΧΡΗΣ Π	ΕΡΕΥΝΗΤΗΣ Δ	Τοπογράφος Μηχανικός / GIS
4	ΑΣΧΟΝΙΤΗΣ Β	ΕΡΕΥΝΗΤΗΣ Δ	Γεωπόνος / Έγγειες Βελτιώσεις
5	ΤΑΝΟΥ Γ	ΕΡΕΥΝΗΤΡΙΑ Δ	Γεωπόνος / Φυσιολογία και Θρέψη Δενδρωδών Καλλιεργειών
6	ΧΑΤΖΗΣΤΑΘΗΣ Θ	ΕΡΕΥΝΗΤΗΣ Δ	Γεωπόνος / Θρέψη φυτών
7	ΤΖΑΝΑΚΑΚΗΣ Β	ΕΡΕΥΝΗΤΗΣ Δ	Γεωπόνος / Επεξεργασία υγρών αποβλήτων
8	ΜΕΤΑΞΑ Ε	ΠΕ	Γεωλόγος MSc Εγγείων Βελτιώσεων
9	ΨΩΜΑ Π	ΠΕ	Χημικός / Χημείο
10	ΜΠΟΥΝΤΛΑ Α	ΠΕ	Χημικός / Χημείο
11	ΠΑΛΑΒΑΤΣΙΟΣ Η	ΠΕ	Γεωλόγος / Χημείο
12	ΟΙΚΟΝΟΜΟΥ Α	ΠΕ	Γεωλόγος / Χημείο
13	ΣΑΡΡΗΣ Α	ΠΕ	Οικονομικός / Λογιστήριο
14	ΣΤΡΙΚΟΣ Γ	ΤΕ	Τεχνολόγος Δασοπονίας / Διεκπεραίωση αποτελεσμάτων
15	ΚΥΡΟΥ Η	ΔΕ	Λογιστήριο
16	ΣΙΣΜΑΝΙΔΟΥ Σ	ΔΕ	Γραμματεία
17	ΑΝΤΩΝΙΑΔΟΥ Ν	ΔΕ	Γραμματεία
18	ΤΣΙΟΤΡΑΣ Χ	ΔΕ	Χημείο
19	ΑΝΔΡΕΑΔΗΣ Η	ΔΕ	Χημείο

ΣΙΝΔΟΣ www.lri.swri.gr 01/01/2019			
Α/Α	**ΟΝΟΜΑΤΕΠΩΝΥΜΟ**	**ΙΔΙΟΤΗΤΑ**	**ΕΙΔΙΚΟΤΗΤΑ / ΘΕΣΗ ΕΡΓΑΣΙΑΣ**
1	ΠΑΝΑΓΟΠΟΥΛΟΣ Α	ΕΡΕΥΝΗΤΗΣ Α	Γεωλόγος / Διαχείριση Υδατικών Πόρων / ΜΕΛΟΣ ΕΣΙ
2	ΔΑΛΑΜΠΑΚΗΣ Χ	ΕΡΕΥΝΗΤΗΣ Β	Γεωλόγος / Γεωθερμικός/ ΜΕΛΟΣ ΕΣΙ
3	ΧΑΤΖΗΓΙΑΝΝΑΚΗΣ Ε	ΕΡΕΥΝΗΤΗΣ Β	Γεωπόνος / Διαχείριση Εδαφοϋδατικών Πόρων / ΜΕΛΟΣ ΕΣΙ
4	ΑΡΑΜΠΑΤΖΗΣ Γ	ΕΡΕΥΝΗΤΗΣ Β	Γεωπόνος / Διαχείριση Υδατικών Πόρων / ΜΕΛΟΣ ΕΣΙ
5	ΔΟΥΛΓΕΡΗΣ Χ	ΕΡΕΥΝΗΤΗΣ Δ	Γεωπόνος / Υδρολογία
6	ΤΖΙΡΙΤΗΣ Ε.	ΕΡΕΥΝΗΤΗΣ Δ	Γεωλόγος / Περιβαλλοντική Υδρογεωχημεία
7	ΠΙΣΙΝΑΡΑΣ Β	ΕΡΕΥΝΗΤΗΣ Δ	Μηχ. Περιβάλλοντος / Διαχείριση Υδατικών Πόρων
8	ΗΛΙΑΣ Α	ΠΕ	Γεωπόνος / MSc Έγγειων Βελτιώσεων

9	ΚΑΛΟΓΙΑΝΝΗ Χ	ΤΕ	MSc Τεχνολόγος Γεωπονίας/ Υ.Δ.Π. συστήματος διαχείρισης εργαστηρίου χημικών δοκιμών
10	ΤΣΕΚΟΥΡΑ Δ	ΠΕ	MSc Χημικός Μηχανικός/ Τ.Ε. συστήματος διαχείρισης εργαστηρίου χημικών δοκιμών
11	ΚΑΡΟΥΛΑ Α	ΠΕ	Μαθηματικός/υπ. λογιστηρίου
12	ΣΤΑΘΑΚΗ Σ	ΠΕ	Γεωλόγος/διαχείριση έργων
13	ΤΣΟΛΑΚΙΔΗΣ Σ	ΔΕ	Τεχνίτης Γεωργίας
14	ΖΕΪΜΠΕΚΗ Ι	ΔΕ	Διοικητικός/Γραμματειακή υποστήριξη
15	ΠΑΠΑΘΑΝΑΣΙΟΥ Α	ΔΕ	Οικονομικός/υποστήριξη έργων
16	ΤΕΡΖΙΔΗΣ Α	ΔΕ	Οικονομικός
17	ΚΑΝΤΟΥΝΑΤΟΥ Γ	ΥΕ	Βοηθητικό προσωπικό εργαστήριου
18	ΚΑΛΟΓΕΡΟΠΟΥΛΟΥ Μ.	ΥΕ	Εργάτρια

ΤΜΗΜΑ ΕΔΑΦΟΛΟΓΙΑΣ ΑΘΗΝΩΝ www.soilscience.gr **01 /01/ 2019**

Α/Α	ΟΝΟΜΑΤΕΠΩΝΥΜΟ	ΙΔΙΟΤΗΤΑ	ΕΙΔΙΚΟΤΗΤΑ / ΘΕΣΗ ΕΡΓΑΣΙΑΣ
1	ΒΑΒΟΥΛΙΔΟΥ Ε	ΕΡΕΥΝΗΤΗΣ Α	Γεωπόνος / ΚΥ ΕΛΓΟ
2	ΚΑΒΒΑΔΙΑΣ Β	ΕΡΕΥΝΗΤΗΣ Α	Δασολόγος
3	ΕΥΘΥΜΙΑΔΟΥ Σ	ΕΡΕΥΝΗΤΡΙΑ Γ	Γεωπόνος
4	ΤΡΙΑΝΤΑΚΩΝΣΤΑΝΤΗΣ Δ	ΕΡΕΥΝΗΤΗΣ Δ	Γεωπόνος
5	ΜΟΝΟΚΡΟΥΣΟΣ Ν	ΕΡΕΥΝΗΤΗΣ Δ	Βιολόγος
6	ΛΙΑΚΟΠΟΥΛΟΥ Ν	MSc, ΠΕ	Χημικός
9	ΛΩΛΟΣ Π	ΠΕ	Γεωπόνος
7	ΛΙΑΚΟΠΟΥΛΟΥ Χ	ΠΕ	Γεωπόνος
8	ΑΡΑΠΑΚΗΣ Δ	ΠΕ	Γεωπόνος
10	ΔΗΜΟΠΟΥΛΟΣ Κ	ΠΕ	Γεωλόγος
11	ΚΑΤΣΟΥΛΑ Α	ΤΕ	Τεχνολόγος Γεωπονίας
12	ΤΟΥΝΤΑΣ Π	ΤΕ	Τεχνολόγος Γεωπονίας
13	ΚΟΚΚΙΝΕΛΗ Α	ΔΕ	ΔΕ Διοικητικός
14	ΖΩΝΤΑΝΟΥ Ε	ΔΕ	ΔΕ Διοικητικός
15	ΜΠΑΝΙΑ Ε	ΔΕ	ΔΕ Οικονομικός
16	ΠΕΤΡΟΠΟΥΛΟΥ Κ	ΔΕ	ΔΕ Βοηθός Εργαστηρίου / Παρασκευάστρια
17	ΚΕΦΑΛΟΓΙΑΝΝΗ Π	ΔΕ	ΔΕ Βοηθός Εργαστηρίου / Παρασκευάστρια
18	ΧΡΗΣΤΙΔΟΥ Β	ΔΕ	ΔΕ Βοηθός Εργαστηρίου
19	ΤΣΟΥΤΣΙΚΟΣ Α	ΥΕ	ΥΕ Εργάτης βοηθητικό προσωπικό

ΤΜΗΜΑ ΓΕΩΡΓΙΚΗΣ ΜΗΧΑΝΙΚΗΣ www.agreng.swri.gr **01/01/2019**

Α/Α	ΟΝΟΜΑΤΕΠΩΝΥΜΟ	ΙΔΙΟΤΗΤΑ	ΕΙΔΙΚΟΤΗΤΑ / ΘΕΣΗ ΕΡΓΑΣΙΑΣ
1	ΦΕΡΕΝΤΙΝΟΣ Κ	ΕΡΕΥΝΗΤΗΣ Γ	Γεωπόνος / Γεωργική Μηχανική
2	ΜΠΟΥΡΟΔΗΜΟΣ Γ	ΠΕ με μεταπτυχιακό	Μαθηματικός / MSc Τεχνολόγος Γεωπόνος
3	ΓΙΑΜΟΥΡΗ Μ	ΠΕ με μεταπτυχιακό	MSc Γεωλόγος
4	ΚΛΑΔΗΣ Γ	ΤΕ	Τεχνολόγος Γεωπόνος
5	ΑΝΤΩΝΟΠΟΥΛΟΥ Ε	ΔΕ	Γραμματεία

6	ΚΑΤΣΑΜΠΟΥΛΑ Μ	ΔΕ	Λογιστήριο
7	ΠΑΠΠΑ Π	ΔΕ	Γραμματεία

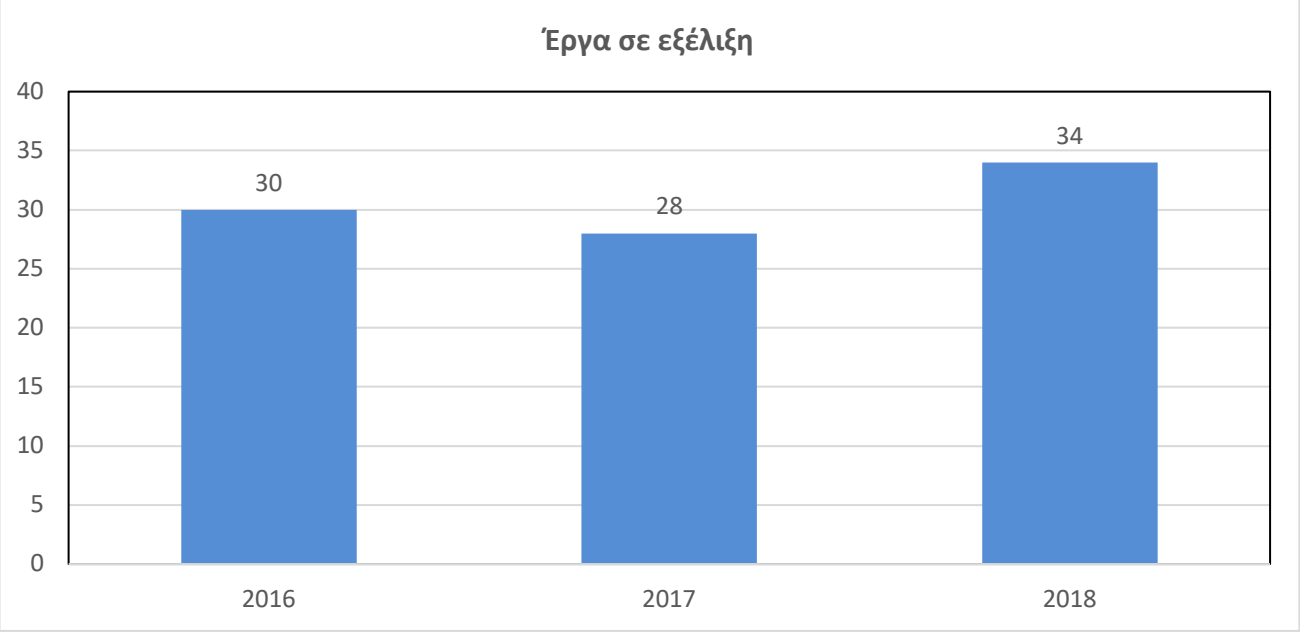
ΠΑΡΑΡΤΗΜΑ Β

ΠΙΝΑΚΑΣ ΥΛΟΠΟΙΟΥΜΕΝΩΝ ΕΡΓΩΝ ΙΝΣΤΙΤΟΥΤΟΥ ΕΔΑΦΟΫΔΑΤΙΚΩΝ ΠΟΡΩΝ

2016 ΚΑΙ ΕΝΤΕΥΘΕΝ

Στα διαγράμματα που ακολουθούν αποτυπώνεται συνοπτικά η εξέλιξη της δραστηριότητας του Ισντιτούτου σε επίπεδο υλοποίησης ερευνητικών έργων, όπως αναλυτικά καταγράφεται στον πίνακα που ακολουθεί.

Αριθμός έργων ανά έτος εκκίνησης της υλοποίησής τους (αφορά έργα που εξακολούθησε η υλοποίησή τους εντός της εξεταζόμενης περιόδου 2016-2018)



Αριθμός έργων που υλοποιούνται σε κάθε ένα από τα εξεταζόμενα έτη (2016-2018)

ΠΙΝΑΚΑΣ ΥΛΟΠΟΙΟΥΜΕΝΩΝ ΕΡΓΩΝ ΙΝΣΤΙΤΟΥΤΟΥ ΕΔΑΦΟΫΔΑΤΙΚΩΝ ΠΟΡΩΝ 2016 ΚΑΙ ΕΝΤΕΥΘΕΝ

Α/Α	ΤΙΤΛΟΣ	ΕΤΟΣ		ΦΟΡΕΑΣ	ΠΡΟΫΠΟΛΟΓΙΣΜΟΣ (ΕΥΡΩ)		ΣΥΜΜΕΤΟΧΕΣ	ΥΠΕΥΘΥΝΟΣ ΙΕΥΠ
1	Διερεύνηση της γονιμότητας των εδαφών οπωρώνων του Α.Σ. Βελβεντού «Η ΔΗΜΗΤΡΑ» για την εφαρμογή συμβουλευτικής λίπανσης	2013	2016	ΑΣ ΔΗΜΗΤΡΑ ΒΕΛΒΕΝΤΟΥ	6.390	6.390	ΙΕΥΠ ΘΕΡΜΗ	Φ. Παπαδόπουλος
2	Διενέργεια αναλύσεων δειγμάτων εδαφών για διάθεση επεξεργασμένης αστικής ιλύος της ΕΥΑΘ σε αγροκτήματα Δυτικού Ν. Θεσσαλονίκης	2015	2016	Eco Four Τεχνική Περιβαλλοντική Μελετητική Ε.Π.Ε.	15.000	15.000	ΙΕΥΠ ΘΕΡΜΗ	Φ. Παπαδόπουλος
3	Διενέργεια αναλύσεων δειγμάτων εδαφών για διάθεση επεξεργασμένης αστικής ιλύος της ΕΥΑΘ σε αγροκτήματα Δυτικού Ν. Θεσσαλονίκης	2015	2016	KAFSIS ΒΙΟΜΗΧΑΝΙΚΗ & ΕΝΕΡΓΕΙΑΚΗ Α.Ε	6.166	6.166	ΙΕΥΠ ΘΕΡΜΗ	Φ. Παπαδόπουλος
4	Περιφέρεια Αττικής - Παρακολούθηση της ποσότητας και ποιότητας των υδάτων σε εφαρμογή της Οδηγίας 2000/60/ΕΚ	2012	2016	ΕΠΠΕΡΑΑ, ΕΤΠΑ	27.250	27.250	ΙΕΥΠ/ΓΔΑΕ	Α. Παναγόπουλος
5	Περιφέρεια Κεντρικής Μακεδονίας - Παρακολούθηση της ποσότητας και ποιότητας των υδάτων σε εφαρμογή της Οδηγίας. 2000/60/ΕΚ	2012	2016	ΕΠΠΕΡΑΑ, ΕΤΠΑ	562.000	562.000	ΙΕΥΠ/ΓΔΑΕ	Α. Παναγόπουλος

6	Περιφέρεια Δυτικής Μακεδονίας - Παρακολούθηση της ποσότητας και ποιότητας των υδάτων σε εφαρμογή της Οδηγίας 2000/60/ΕΚ	2012	2016	ΕΠΠΕΡΑΑ, ΕΤΠΑ	84.500	84.500	ΙΕΥΠ/ΓΔΑΕ	Α. Παναγόπουλος
7	Παρακολούθηση της ποσότητας και ποιότητας των υδάτων σε εφαρμογή της Οδηγίας 2000/60/ΕΚ στα όρια των ακόλουθων περιφερειών της χώρας: Ηπείρου, Θεσσαλίας, Ανατολικής Μακεδονίας και Θράκης, Ιονίων Νήσων, Βορείου Αιγαίου, Δυτικής Ελλάδας, Πελοποννήσου και Κρήτης	2012	2016	ΕΠΠΕΡΑΑ, ΕΤΠΑ	1.400.700	1.400.700	ΙΕΥΠ/ΓΔΑΕ (ΙΥΦΕΧ)	Γ. Αραμπατζής
8	Περιφέρεια Νοτίου Αιγαίου - Παρακολούθηση της ποσότητας και ποιότητας των υδάτων σε εφαρμογή της Οδηγίας 2000/60/ΕΚ	2012	2016	ΕΠΠΕΡΑΑ, ΕΤΠΑ	17.900	17.900	ΙΕΥΠ/ΓΔΑΕ	Α. Παναγόπουλος
9	Περιφέρεια Στερεάς Ελλάδας - Παρακολούθηση της ποσότητας και ποιότητας των υδάτων σε εφαρμογή της Οδηγίας 2000/60/ΕΚ	2012	2016	ΕΠΠΕΡΑΑ, ΕΤΠΑ	266.800	266.800	ΙΕΥΠ/ΓΔΑΕ	Α. Παναγόπουλος

10	Σχεδίαση δικτύων παρακολούθησης και εκτέλεση προγράμματος δειγματοληψιών για τη διερεύνηση υπολειμμάτων του νηματωδοκτόνου FENAMIPHOS και των μεταβολιτών του στα υπόγεια νερά της Ελλάδας	2014	2016	AGAN CHEMICAL MANUFACTURERS LTD/AMVAC CHEMICAL CORPORATION	215.250	215.250	ΙΕΥΠ/ΙΥΦΕΧ/ΙΦΗ	Α. Παναγόπουλος Γ. Αραμπατζής
11	Ενίσχυση της υφιστάμενης εργαστηριακής υποδομής του Ινστιτούτου Γεωργικών Μηχανών και Κατασκευών (Ι.ΓΕ.Μ.Κ.) του Εθνικού Ιδρύματος Αγροτικής Έρευνας (ΕΘ.Ι.ΑΓ.Ε.) για τον έλεγχο ψεκαστικών μηχανημάτων	2011	2016	ΕΣΠΑ, Επιχειρησιακό Πρόγραμμα «Αττική». Άξονας Προτεραιότητας «03- Ενίσχυση της Ανταγωνιστικότητας της Καινοτομίας και της Ψηφιακής Σύγκλισης»	500.000	500.000	ΙΕΥΠ / ΤΓΜ	Γ. Κλάδης
12	Αυτοχρηματοδοτούμενο πρόγραμμα παροχής υπηρεσιών "Δοκιμές Γεωργικών Μηχανημάτων, Εξοπλισμού και Υλικών"	2016	2016	Μεμονωμένοι αγρότες	28.500	28.500	ΙΕΥΠ / ΤΓΜ	Γ. Μπουροδήμος

13	Υποέργο Παροχής Υπηρεσιών προς Τρίτους Έτους 2016 "Αναλύσεις Εδαφών, Νερών, Φυτικών Ιστών, Στερεών και Υγρών Απόβλητων, Έτους 2016»	2016	2016	Μεμονωμένοι αγρότες	55.000	55.000	ΙΕΥΠ ΘΕΡΜΗ	Φ. Παπαδόπουλος
14	Χημικές αναλύσεις και προσδιορισμοί φυσικών παραμέτρων σε δείγματα εδαφών, νερών, φυτικών ιστών, στερεών - υγρών αποβλήτων και λιπασμάτων και συμβουλευτική υποστήριξη εφαρμογών αξιοποίησης γεωθερμικής ενέργειας σε αγροτικές χρήσεις.	2016	2016	Μεμονωμένοι αγρότες	20.700	20.700	ΙΕΥΠ ΣΙΝΔΟΣ	Ε.Χατζηγιαννάκης Π.Δαλαμπάκης
15	Αξιολογηση Της Ποιοτητας Των Εδαφων Και Της Χρησης Επεξεργασμενων Αστικων Και Κτηνοτροφικων Αποβλητων Για Την Αναδασωση Περιοχης Γειτνιαζουσας Στις Εγκαταστασεις Της Εταιριας Μεγαεco Στην Περιοχη Του Δημου Μεγαρεων	2015	2016	ΜεγαEco	7.700	7.700	1. ΤΕΑ 2. ΜεγαEco	Β. ΚΑΒΒΑΔΙΑΣ
16	Ανάλυση δειγμάτων εδαφών και φύλλων των καλλιεργειών των περιοχών Περιφερειακής Ενότητας Γρεβενών περιόδου 2015-2017.	2015	2017	ΠΕ ΓΡΕΒΕΝΩΝ	20.000	20.000	ΙΕΥΠ ΘΕΡΜΗ	Φ. Παπαδόπουλος
17	Διερεύνηση της γονιμότητας των εδαφών σε πολυετείς και μονοετείς καλλιέργειες περιοχών της Βόρειας Ελλάδας για την ορθολογική χρήση λιπασμάτων κατά την περίοδο 2014-2017.	2014	2017	ΤΣΑΓΚΑΛΙΔΗΣ ΑΝΔΡΕΑΣ «ΑΓΡΟΔΥΝΑΜΙΚΗ	8.250	8.250	ΙΕΥΠ ΘΕΡΜΗ	Φ. Παπαδόπουλος

18	Διερεύνηση της γονιμότητας των εδαφών οπωρώνων της ΓΕΟΚ-ΟΠ-ΕΓΑ για την εφαρμογή συμβουλευτικής λίπανσης".	2014	2017	ΓΕΟΚ-ΟΠ-ΕΓΑ Ν. Καστοριάς	7.350	7.350	ΙΕΥΠ ΘΕΡΜΗ	Φ. Παπαδόπουλος
19	Διεξαγωγή εργαστηριακών αναλύσεων δειγμάτων εδαφών από τις αποκαταστημένες εκτάσεις του ΛΚΔΜ	2015	2017	ΔΕΗ Α.Ε. Λιγνιτικό Κέντρο Δυτικής Μακεδονίας	25.558	25.558	ΙΕΥΠ ΘΕΡΜΗ	Φ. Παπαδόπουλος
20	Διερεύνηση της γονιμότητας των εδαφών οπωρώνων του ΑΣΕΠΟΠ Βελβεντού για την εφαρμογή συμβουλευτικής λίπανσης.	2014	2017	ΑΣΕΠΟΠ ΒΕΛΒΕΝΤΟΥ	13.500	13.500	ΙΕΥΠ ΘΕΡΜΗ	Φ. Παπαδόπουλος
21	Μελέτη της δράσης των λιπασμάτων ελεγχόμενης απελευθέρωσης αζώτου COTEN MIX της Εταιρείας HAIFA	2017	2017	i-CON. SHARE Μονοπρόσωπη Ι.Κ.Ε	3.030	3.030	ΙΕΥΠ ΘΕΡΜΗ	Φ. Παπαδόπουλος
22	Introduction of new oLIVE crop management practices focused on CLIMAte change mitigation and adaptation - oLIVE-CLIMA LIFE+	2012	2017	ΕΕ		74.900	1. ΑΝΑΤΟΛΙΚΗ 2. ΙΕΛΥΑ 3. ΙΕΥΠ ΣΙΝΔΟΣ 4. ΡΟΔΑΞ ΑΓΡΟ ΑΕ	Γ. Αραμπατζής Ε.Χατζηγιαννάκης

23	Introduction of new oLIVE crop management practices focused on CLIMAte change mitigation and adaptation-oLIVE CLIMA	2012	2017	ΕΕ	3.649.373	322.994	1. ANATOLIKI 2. ΕΛΓΟ • Ινστιτούτο Ελιάς και Υποτροπικών Φυτών Χανίων • ΙΕΥΠ ΣΙΝΔΟΣ • ΙΕΥΠ ΤΕΑ 3. RODAXAGRO 4. Unibas-DICEM – ITALY 5. AGROTYPOS 6. Ο.Π. ΝΗΛΕΑΣ 7. Ε.Α.Σ. ΠΕΖΩΝ 8. Ε.Α.Σ. ΜΙΡΑΜΒΕΛΛΟΥ	Β. ΚΑΒΒΑΔΙΑΣ
24	Sustainable strategies for the improvement of seriously degraded agricultural areas». The example of Pistachia vera L.-AgroStrat	2012	2017	ΕΕ	2.053.018	509.504	1. ΕΛΓΟ / ΤΕΑ, 2. Ινστιτούτο Μεσογειακών Σπουδών 3. ΙΤΕ 4. Πολυτεχνείο Κρήτης	ΝΤΟΥΛΑ Μ.
25	Υποέργο Παροχής Υπηρεσιών προς Τρίτους Έτους 2017 "Αναλύσεις Εδαφών, Νερών, Φυτικών Ιστών, Στερεών και Υγρών Απόβλητων, Έτους 2017»	2017	2017	Μεμονωμένοι αγρότες	46.978	46.978	ΙΕΥΠ ΘΕΡΜΗ	Φ. Παπαδόπουλος

26	Αυτοχρηματοδοτούμενο πρόγραμμα παροχής υπηρεσιών "Δοκιμές Γεωργικών Μηχανημάτων, Εξοπλισμού και Υλικών"	2017	2017	Μεμονωμένοι αγρότες	43.000	43.000	ΙΕΥΠ / ΤΓΜ	Γ. Μπουροδήμος
27	Χημικές αναλύσεις και προσδιορισμοί φυσικών παραμέτρων σε δείγματα εδαφών, νερών, φυτικών ιστών, στερεών - υγρών αποβλήτων και λιπασμάτων και συμβουλευτική υποστήριξη εφαρμογών αξιοποίησης γεωθερμικής ενέργειας σε αγροτικές χρήσεις.	2017	2017	Μεμονωμένοι αγρότες	15.642	15.642	ΙΕΥΠ ΣΙΝΔΟΣ	Ε.Χατζηγιαννάκης Π.Δαλαμπάκης
28	Μελέτη της ταχύτητας απορρόφησης Βορίου και Ψευδαργύρου από φύλλα μηλιάς μετά την εφαρμογή διαφορετικών σκευασμάτων.	2018	2018	AGROLOGY	2.500	2.500	ΙΕΥΠ ΘΕΡΜΗ	Γ. Τάνου
29	Διενέργεια αναλύσεων δειγμάτων εδαφών και φύλλων σε οπωρώνες του ΑΣΕΠΟΠ Νάουσας των νομών Ημαθίας και Πέλλας και παροχή οδηγιών για εφαρμογή ορθολογικής λίπανσης σε οπωρώνες φυλλοβόλων οπωροφόρων περιόδου 2015-2018..	2015	2018	ΑΣΕΠΟΠ ΝΑΟΥΣΑΣ	16.250	8.750	1. ΙΝΣΤΙΤ. ΦΥΛΛΟΒΟΛ. ΔΕΝΔΡΩΝ ΝΑΟΥΣΑΣ 2. ΙΕΥΠ ΘΕΡΜΗ	Φ. Παπαδόπουλος

30	Μελέτη εδαφικών βιολογικών χαρακτηριστικών σε αποκατεστημένες εκτάσεις του Λιγνιτικού Κέντρου Δυτικής Μακεδονίας	2017	2018	ΔΕΗ Α.Ε.	3.100	3.100	ΤΕΑ	Ν. ΜΟΝΟΚΡΟΥΣΟΣ
31	Διενέργεια αναλύσεων δειγμάτων εδαφών για διάθεση επεξεργασμένης αστικής ιλύος της ΕΥΑΘ σε αγροκτήματα Ν. Θεσσαλονίκης.	2016	2018	KAFSIS ΒΙΟΜΗΧΑΝΙΚΗ & ΕΝΕΡΓΕΙΑΚΗ Α.Ε	27.000	27.000	ΙΕΥΠ ΘΕΡΜΗ	Π. Ψωμά
32	Διενέργεια αναλύσεων δειγμάτων εδαφών για διάθεση επεξεργασμένης αστικής ιλύος της ΕΥΑΘ σε αγροκτήματα Ν. Θεσσαλονίκης.	2016	2018	Eco Four Τεχνική Περιβαλλοντική Μελετητική Ε.Π.Ε.	27.000	27.000	ΙΕΥΠ ΘΕΡΜΗ	Π. Ψωμά
33	Διερεύνηση της γονιμότητας των εδαφών και της θρεπτικής κατάστασης αμπελώνων της Ε. ΤΣΑΝΤΑΛΗΣ για την εφαρμογή συμβουλευτικής λίπανσης.	2016	2018	ΤΣΑΝΤΑΛΗΣ Α.Ε.	2.850	2.850	ΙΕΥΠ ΘΕΡΜΗ	Φ. Παπαδόπουλος
34	Υποέργο Παροχής Υπηρεσιών προς Τρίτους Έτους 2018 "Αναλύσεις Εδαφών, Νερών, Φυτικών Ιστών, Στερεών και Υγρών Απόβλητων, Έτους 2018»	2018	2018	Μεμονωμένοι αγρότες	53.276	53.276	ΙΕΥΠ ΘΕΡΜΗ	Β.Ασχονίτης
35	Αυτοχρηματοδοτούμενο πρόγραμμα παροχής υπηρεσιών "Δοκιμές Γεωργικών Μηχανημάτων, Εξοπλισμού και Υλικών"	2018	2018	Μεμονωμένοι αγρότες	120.000	120.000	ΙΕΥΠ / ΤΓΜ	Γ. Μπουροδήμος

36	Χημικές αναλύσεις και προσδιορισμοί φυσικών παραμέτρων σε δείγματα εδαφών, νερών, φυτικών ιστών, στερεών - υγρών αποβλήτων και λιπασμάτων και συμβουλευτική υποστήριξη εφαρμογών αξιοποίησης γεωθερμικής ενέργειας σε αγροτικές χρήσεις.	2018	2018	Μεμονωμένοι αγρότες	17.506	17.506	ΙΕΥΠ / ΣΙΝΔΟΣ	Ε.Χατζηγιαννάκης Π.Δαλαμπάκης
37	ΥΛΟΠΟΙΗΣΗ ΥΠΟΕΡΓΩΝ ΠΑΡΟΧΗΣ ΥΠΗΡΕΣΙΩΝ ΠΡΟΣ ΤΡΙΤΟΥΣ	2018	2018	Μεμονωμένοι αγρότες	21667	21667	ΙΕΥΠ / ΤΕΑ	Β. ΚΑΒΒΑΔΙΑΣ
38	Τεχνοεπιστημονική υποστήριξη της ΔΕΥΑΑ Παγγαίου στην ορθολογική αξιοποίηση και διαχείριση του γεωθερμικού πεδίου Ακροποτάμου Ν. Καβάλας	2018	2018	ΔΕΥΑΑ ΔΗΜΟΥ ΠΑΓΓΑΙΟΥ	18.600	18.600	ΙΕΥΠ / ΣΙΝΔΟΣ	Π. Δαλαμπάκης
39	Έκθεση αποτελεσμάτων στο πλαίσιο της δειγματοληψίας των εδαφών της περιοχής του Πεδίου Άρεως και Αττικού άλσους	2018	2018	ΠΕΡΙΦΕΡΕΙΑ ΑΤΤΙΚΗΣ	1.178	1.178	ΙΕΥΠ/ ΤΕΑ	Β. ΚΑΒΒΑΔΙΑΣ
40	International virtual topic-network on modelling and management of catchments in Mediterranean basins	2014	2018	Julich Research Centre – IBG - 3	18.500	18.500	JULICH RESEARCH CENTRE/IBG-3	A. Panagopoulos

41	Γαιογνώση - διερεύνηση της γονιμότητας των εδαφών και της θρεπτικής κατάστασης αγροκτημάτων για την εφαρμογή συμβουλευτικής λίπανσης.	2016	2019	ΓΑΙΟΓΝΩΣΗ Ο.Ε.	3.000	3.000	ΙΕΥΠ ΘΕΡΜΗ	Φ. Παπαδόπουλος
42	Διερεύνηση της γονιμότητας των εδαφών και της θρεπτικής κατάστασης αγροκτημάτων για την εφαρμογή συμβουλευτικής λίπανσης σε αγροκτήματα της εταιρείας QUALITY AGROSOLUTION».	2017	2019	QUALITY AGROSOLUTION	3.000	3.000€	ΙΕΥΠ ΘΕΡΜΗ	Φ. Παπαδόπουλος
43	Διερεύνηση της γονιμότητας των εδαφών και της θρεπτικής κατάστασης των αμπελώνων της εταιρείας: ΟΙΝΟΠΟΙΗΤΙΚΗ ΑΝΩΝΥΜΗ ΕΤΑΙΡΕΙΑ «ΚΤΗΜΑ ΣΙΓΑΛΑ	2017	2019	ΟΙΝΟΠΟΙΗΤΙΚΗ ΑΝΩΝΥΜΗ ΕΤΑΙΡΕΙΑ «ΚΤΗΜΑ ΣΙΓΑΛΑ»	3.000	3.000	ΙΕΥΠ ΘΕΡΜΗ	Θ. Χατζηστάθης
44	Μελέτη της επίδρασης του πυριτίου στη φυσιολογία και στη θρέψη καλλιεργειών	2018	2019	AGROLOGY ΠΑΠΑΟΙΚΟΝΟΜΟΥ Α.Β.Ε.Ε	21.000	21.000	ΙΕΥΠ ΘΕΡΜΗ	Γ. Τάνου
45	Ενίσχυση της υφιστάμενης εργαστηριακής υποδομής του Ελληνικού Γεωργικού Οργανισμού ΔΗΜΗΤΡΑ για τον έλεγχο ψεκαστικών μηχανημάτων	2017	2019	ΕΤΠΑ / ΕΠΑνΕΚ	230.000	230.000	ΙΕΥΠ / ΤΓΜ	Γ. Κλάδης
46	«Addressing Med fly with an innovative and environment friendly attractant through an Integrated Pest Management Strategy»LIFE BIODELEAR	2014	2019	ΕΕ	2.205.454	764.198	1. ΕΛΓΟ / ΤΕΑ 2. ΑΠΘ 3. Παν. Θεσσαλίας 4. Μπενάκειο	Βασίλειος Μαυραγάνης

47	Διερεύνηση της γονιμότητας των εδαφών οπωρώνων του Α.Σ. Βελβεντού «Η ΔΗΜΗΤΡΑ» για την εφαρμογή συμβουλευτικής λίπανσης.	2017	2020	Α.Σ. ΒΕΛΒΕΝΤΟΥ "ΔΗΜΗΤΡΑ"	6.970	6.970	ΙΕΥΠ ΘΕΡΜΗ	Φ. Παπαδόπουλος
48	Διερεύνηση της γονιμότητας των εδαφών και της θρεπτικής κατάστασης αγροκτημάτων για την εφαρμογή συμβουλευτικής λίπανσης, κατά την περίοδο 2017-2020.	2017	2020	ΤΣΑΓΚΑΛΙΔΗΣ ΑΝΔΡΕΑΣ «ΑΓΡΟΔΥΝΑΜΙΚΗ»	8.500	8.500	ΙΕΥΠ ΘΕΡΜΗ	Θ. Χατζηστάθης
49	Εμβληματική δράση "Οι δρόμοι της Ελιάς"	2018	2020	ΓΓΕΤ	3.090.940	50.000	1. ΕΛΓΟ - ΔΗΜΗΤΡΑ • ΙΓΒΦΠ • ΙΕΛΥΑ • ΙΕΥΠ ΘΕΡΜΗ 2. ΓΕΩΠ.ΠΑΝ.ΑΘΗΝΩΝ 3. ΜΑΙΧ 4. ΑΠΘ 5. ΙΤΕ 6. ΕΚΕΤΑ 7. ΕΚΠΑ 8. ΠΑΝ. ΘΕΣΣΑΛΙΑΣ 9. ΤΕΙ ΚΡΗΤΗΣ 10. ΜΠΕΝΑΚΕΙΟ 11. ΠΑΝ. ΠΑΤΡΩΝ 12. ΕΦΕΤ 13. ΦΛΕΜΙΓΚ	Γ. Τάνου

50	VR-Park: Σύστημα επαυξημένης πραγματικότητας για την ανάδειξη και περιήγηση αστικών πάρκων	2018	2020	ΓΓΕΤ	761.034	208.332	1. ΕΛΓΟ / ΙΕΥΠ - ΤΓΜ 2. Ε.Κ. ΑΘΗΝΑ (Ινστιτούτο Πληροφοριακών Συστημάτων) 3. Περιφέρεια Αττικής (Διεύθυνση Πάρκων & Αλσών) 4. OMEGA TECHNOLOGY Bytelogic	Κ. Φερεντίνος
51	«Promoting water efficiency and supporting the shift towards a climate resilient agriculture in Mediterranean countries» - AgroClimaWater LIFE+	2015	2020	ΕΕ	2.423.223	235.015	1. ΕΛΓΟ / • ΙΕΥΠ ΣΙΝΔΟΣ • ΙΕΛΥΑ 2. ΕΑΣ ΜΕΡΑΜΠΕΛΟΥ 3. ΡΟΔΑΞ ΑΓΡΟ ΑΕ 4. DICEM 5. ASSOFRUIT ITALIA	Γ. Αραμπατζής Β. Πισινάρας

52	"Providing services for management of natural resources" Re-Source, INTERREG BALKAN MEDITERRANEAN 2014-2020	2018	2020	INTERREG BALKAN MEDITERRANEAN 2014-2020	1.021.100	100.000	1. ΙΕΥΠ ΣΙΝΔΟΣ 2. ΠΕΡΙΦΕΡΕΙΑ ΘΕΣΣΑΛΙΑΣ 3. EXECUTIVE FOREST AGENCY 4. ΒΟΥΛΓΑΡΙΑ MINISTRY OF ENVIRONMENT 5. ΑΛΒΑΝΙΑ/MUNICIPALITY OF BERAT 6. ΑΛΒΑΝΙΑ/MUNICIPALITY OF KOCANI 7. FYROM 8. ΚΥΠΡΟΣ ΙΝΤΣΙΤΟΥΤΟ ΓΕΩΡΓΙΚΩΝ ΕΡΕΥΝΩΝ 9. ΥΠΑΑΤ	G. Arampatzis Ε. Hatzigiannakis
53	ΕΔΚ- Αξιολόγηση – Βελτίωση – Ανάδειξη - Αξιοποίηση Σημαντικών Ελληνικών Ποικιλιών Οπωροφόρων	2018	2021	ΓΓΕΤ	840.000	2.000	1. ΒΙΤΡΟ ΕΛΛΑΣ 2. ΝΟΒΑΣΕΡΤ 3. ΓΚΛΑΒΑΚΗΣ Ε. 4. Πανεπ. Θεσσαλίας 5. ΕΚΕΤΑ 6. ΑΠΘ 7. ΕΛΓΟ (ΙΕΥΠ / ΙΦΓΠ)	Γ. Τάνου
54	Διερεύνηση της γονιμότητας των εδαφών αγροκτημάτων της ΓΕΟΚ-ΟΠ-ΕΓΑ για την εφαρμογή συμβουλευτικής λίπανσης, κατά την περίοδο 2018-2021	2018	2021	ΓΕΟΚ-ΟΠ-ΕΓΑ Ν. Καστοριάς	8.400	8.400	ΙΕΥΠ ΘΕΡΜΗ	Θ. Χατζηστάθης

55	Recovery of olive oil by-products through bio/hydro chars production for agricultural soil fertilization and environment preservation-FERTICHAR, ARIMNET 2	2018	2021	ARIMNET 2	488.400	40.000	1. ΙΕΥΠ ΣΙΝΔΟΣ 2. CERTE 3. IS2M 4. RITTMO 5. BURGOS UNIVERSITY	Ch. Doulgeris
56	Εξειδικευμένη τεχνο-επιστημονική υποστήριξη του Δήμου Αλεξανδρούπολης στη διαχείριση - ανάπτυξη του γεωθερμικού πόρου και στην εφαρμογή των έργων εκμετάλλευσης	2018	2021	ΔΗΜΟΣ ΑΛΕΞΑΝΔΡΟΥΠΟΛΗΣ	24.800	24.800	ΙΕΥΠ ΣΙΝΔΟΣ	Π. Δαλαμπάκης
57	Διενέργεια αναλύσεων δειγμάτων εδαφών και φύλλων σε οπωρώνες του ΑΣΕΠΟΠ Νάουσας των νομών Ημαθίας και Πέλλας και παροχή οδηγιών για εφαρμογή ορθολογικής λίπανσης σε οπωρώνες φυλλοβόλων οπωροφόρων περιόδου 2018-2023..	2018	2023	ΑΣΕΠΟΠ ΝΑΟΥΣΑΣ	16.250	8.750	1. ΙΓΒΦΠ / ΤΜΗΜΑ ΦΥΛΛΟΒΟΛ. ΔΕΝΔΡΩΝ ΝΑΟΥΣΑΣ 2. ΙΕΥΠ ΘΕΡΜΗ	Β.Ασχονίτης
58	«Παρακολούθηση της ποσότητας και ποιότητας των υδάτων σε εφαρμογή της Οδηγίας 2000/60/ΕΚ στην Ελληνική Επικράτεια	2017	2023	Υ.ΜΕ.ΠΕΡ.Α.Α.-ΤΑΜΕΙΟ ΣΥΝΟΧΗΣ	5.597.413	5.597.413	1. ΙΕΥΠ ΣΙΝΔΟΣ 2. ΓΔΑΕ 3. ΙΥΦΕΧ 4. ΙΔΟ 5. ΙΔΕ	Ε.Χατζηγιαννάκης Π. Δαλαμπάκης

59	Salinization of critical groundwater reserves in coastal Mediterranean areas: Identification, risk assessment and sustainable management with the use of integrated modelling and smart ICT tools	2019	2022	PRIMA	1.390.000	280.000	* ΙΕΥΠ ΣΙΝΔΟΣ * Center for Research and Technology (Greece), Information Technologies Institute * Mobilisation and Water Resources Management Laboratory, Batna 2 University (Algeria) * University of Applied Sciences, Lübeck, Germany / Civil Engineering, Laboratory for Hydrology and International Water Management (Germany) * Environment and Information Technology Centre (Germany) * Cyprus University of Technology, Department of Civil Engineering and Geomatics (Cyprus) * Polytechnic University of Bari, DICATECh Dept (Italy) * Faculty of Science of Tunis, Department of Geology (Tunisia) * Mersin University, Faculty of Engineering (Turkey)	Ε.Τζιρίτης

60	Dual cropping system, Genetic Diversity, Decision support and Digital tool for Designing Eco-efficient Cereal-Legume Integrated food value Chain in the Mediterranean Basin	2018	2021	ARIMNET 2	256.000	20.000	1. UMR SYSTEM 2. IAV-Hassan II 3. CBBC 4. ΕΛΓΟ / ΙΕΥΠ ΘΕΡΜΗ 5. UMR IATE	Π. Τζιαχρής
61	Εδαφολογικές μελέτες Περιφερειακής Ενότητας Γρεβενών περιόδου 2018-2020.	2018	2020	ΠΕ ΓΡΕΒΕΝΩΝ	20.000	20.000	ΙΕΥΠ ΘΕΡΜΗ	Π. Τζιαχρής
62	Διερεύνηση της γονιμότητας των εδαφών οπωρώνων του ΑΣΕΠΟΠ Βελβεντού για την εφαρμογή συμβουλευτικής λίπανσης με GIS περιοδου 2017-2020.	2017	2020	ΑΣΕΠΟΠ ΒΕΛΒΕΝΤΟΥ	13.500	13.500	ΙΕΥΠ ΘΕΡΜΗ	Π. Τζιαχρής
	ΣΥΝΟΛΟ ΠΡΟΫΠΟΛΟΓΙΣΜΟΥ (ΕΥΡΩ)				**27.860.966**	**12.274.367**		
	ΑΝΑΛΥΣΗ ΠΡΟΫΠΟΛΟΓΙΣΜΟΥ ΑΝΑ ΘΕΜΑΤΙΚΗ ΕΝΟΤΗΤΑ							
	Γονιμότητα εδαφών, θρέψη - Φυσιολογία φυτών				10.793.418	1.420.085		
	Διαχείριση υδατικών πόρων				12.809.386	8.590.078		
	Ρύπανση εδαφών - νερού				2.532.228	1.090.972 €		
	Γεωθερμία				43.400 €	43.400		
	Γεωργική Μηχανική				1.682.534	1.129.832		

ΠΑΡΑΡΤΗΜΑ Γ:
ΠΙΝΑΚΕΣ ΥΠΟΒΛΗΘΕΙΣΩΝ ΠΡΟΤΑΣΕΩΝ

ΠΙΝΑΚΑΣ ΥΠΟΒΛΗΘΕΙΣΩΝ ΠΡΟΤΑΣΕΩΝ ΜΕΤΡΟΥ 16 ΣΥΝΕΡΓΑΣΙΑ ΠΑΑ 2014-2020

Α/Α	ΥΠΟΜΕΤΡΟ	ΑΚΡΩΝΥΜΙΟ / ΤΙΤΛΟΣ	ΣΥΝΕΡΓΑΖΟΜΕΝΟΙ ΦΟΡΕΙΣ	ΠΕΡΙΦΕΡΕΙΑΚΟ - ΕΘΝΙΚΟ ΣΥΝΤΟΝΙΣΤΗΣ
1	16.1 -16.2	**ΑΙΘΕΡΙΑ ΕΛΑΙΟΛΑΔΑ** / Παρασκευή και τυποποίηση σειράς βιολογικών σκευασμάτων ελαιόλαδου με προσθήκη αιθέριου ελαίου αρωματικών φυτών, για προώθησή τους στην διεθνή γαστρονομική αγορά	**1. ΕΛΓΟ "ΔΗΜΗΤΡΑ" /** • ΙΓΒΦΠ/Εργαστ.Προστασίας& Αξιοπ/σης Αυτοφυών και Ανθοκομικών • ΙΕΥΠ Θέρμης • ΙΕΛΥΑ/ Εργαστήρια Ελαιολάδου Μυτιλήνης, Καλαμάτας, Χανίων 2. **ΑΠΘ**/Σχολή Θετικών Επιστημών/Τμήμα Χημείας/Εργαστήριο Χημείας και Τεχνολογίας Τροφίμων 3. **Κωνσταντάρας Παναγιώτης** Αγρότης-ελαιοπαραγωγός Λέσβου **4. Αγροτικός Συνεταιρισμός Μεταγγιτσίου Χαλκιδικής** 5. **Μιχάλης Γεωργάρας** Αγρότης – Παραγωγός Ρίγανης 6. **EURICON Ε.Π.Ε**. – Σύμβουλοι Επιχειρήσεων	ΕΘΝΙΚΟ ΕΛΓΟ / Ε. Μαλούπα

2	16.1– 16.2	**SUSTAINABLEPEACH /** Σχεδίαση Υπηρεσιών Ευφυούς Γεωργίας για τη Βελτίωση της Οικονομικής Αποδοτικότητας της Καλλιέργειας του Ροδάκινου.	1. *«**NEUROPUBLIC** ΑΝΩΝΥΜΗ ΕΤΑΙΡΕΙΑ ΠΛΗΡΟΦΟΡΙΚΗΣ & ΕΠΙΚΟΙΝΩΝΙΩΝ»,* 2. *«**GAIA ΕΠΙΧΕΙΡΕΙΝ** ΑΝΩΝΥΜΗ* ΕΤΑΙΡΕΙΑ ΨΗΦΙΑΚΩΝ ΥΠΗΡΕΣΙΩΝ», 3. «**ΕΛΓΟ** - «ΔΗΜΗΤΡΑ», **ΙΕΥΠ** (ΘΕΡΜΗ) **ΙΓΒΦΠ**/Τμήμα Φυλλοβόλων Οπωροφόρων Δένδρων ΝΑΟΥΣΑΣ. 4. ΑΓΡΟΤΙΚΟΣ **ΣΥΝΕΤΑΙΡΙΣΜΟΣ ΕΠΙΣΚΟΠΗΣ «**Ο ΑΛΕΞΑΝΔΡΟΣ**»** 5. **ΑΣΟ ΒΕΛΒΕΝΤΟΥ** Η ΔΗΜΗΤΡΑ»	ΠΕΡΙΦΕΡΕΙΑΚΟ NEUROPUBLIC
3	16.1– 16.2	**KIWIDOM** / ΑΥΞΗΣΗ ΤΟΥ ΠΟΣΟΣΤΟΥ ΞΗΡΑΣ ΟΥΣΙΑΣ ΤΟΥ ΑΚΤΙΝΙΔΙΟΥ ΞΑΝΘΗΣ, ΜΕΣΩ ΤΟΥ ΕΛΕΓΧΟΥ ΤΗΣ ΆΡΔΕΥΣΗΣ ΚΑΙ ΤΗΣ ΣΧΕΣΗΣ ΑΡΙΘΜΟΥ ΦΥΛΛΩΝ/ΚΑΡΠΩΝ.	1. ΕΛ.Γ.Ο. ‘ΔΗΜΗΤΡΑ’ (ΙΕΥΠ ΘΕΡΜΗ) 2. ΑΓΡΟΤΙΚΟΣ ΣΥΝΕΤΑΙΡΙΣΜΟΣ ΞΑΝΘΗΣ ' Η ΕΝΩΣΗ' 3. ΑΠΘ 4. AGRO Q	ΠΕΡΙΦΕΡΕΙΑΚΟ ΕΛΓΟ / Γ. Τάνου
4	16.1– 16.2	**PEACHIT** / ΑΞΙΟΠΟΙΗΣΗ ΤΕΧΝΟΛΟΓΙΩΝ ΠΛΗΡΟΦΟΡΙΚΗΣ ΚΑΙ ΕΠΙΚΟΙΝΩΝΙΑΣ ΓΙΑ ΑΡΔΕΥΣΗ ΑΚΡΙΒΕΙΑΣ ΣΤΑ ΑΓΡΟΚΤΗΜΑΤΑ ΡΟΔΑΚΙΝΙΑΣ ΤΟΥ ΑΣΕΠΟΠ ΒΕΛΒΕΝΤΟΥ.	1. ΕΛ.Γ.Ο. ‘ΔΗΜΗΤΡΑ’ (ΙΕΥΠ ΘΕΡΜΗ) 2. ΑΣΕΠΟΠ ΒΕΛΒΕΝΤΟΥ ΣΥΝ.Π.Ε. 3. ΑΠΘ 4. AGRO Q	ΠΕΡΙΦΕΡΕΙΑΚΟ ΕΛΓΟ / Γ. Τάνου
5	16.1– 16.2	**CHERRCULTIEVAL** / ΑΞΙΟΛΟΓΗΣΗ ΠΟΙΚΙΛΙΩΝ ΚΕΡΑΣΙΑΣ ΣΤΗ ΡΑΧΗΣ ΠΙΕΡΙΑΣ ΚΑΙ ΕΦΑΡΜΟΓΗ ΣΤΟΧΕΥΜΕΝΗΣ ΘΡΕΨΗΣ ΓΙΑ ΤΗΝ ΑΝΤΙΜΕΤΩΠΙΣΗ ΤΟΥ ΣΧΙΣΙΜΑΤΟΣ ΤΩΝ ΚΑΡΠΩΝ.	1. ΕΛ.Γ.Ο. ‘ΔΗΜΗΤΡΑ’ (ΙΕΥΠ ΘΕΡΜΗ) 2. Αγροτικός Συνεταιρισμός Ράχης Πιερίας «Ο ΑΓΙΟΣ ΛΟΥΚΑΣ» 3. ΑΠΘ 4. NOVACERT	ΠΕΡΙΦΕΡΕΙΑΚΟ ΕΛΓΟ / Γ. Τάνου
6	16.1– 16.2	**MECHANIPEACH** / ΕΚΜΗΧΑΝΙΣΗ ΤΗΣ ΚΑΛΛΙΕΡΓΕΙΑΣ ΡΟΔΑΚΙΝΟΥ ΣΤΗΝ ΠΕΡΙΟΧΗ ΤΟΥ ΑΜΥΝΤΑΙΟΥ ΣΕ	1. ΕΛ.Γ.Ο. ‘ΔΗΜΗΤΡΑ’ (ΙΕΥΠ ΘΕΡΜΗ) 2. ΑΓΡΟΤΙΚΟΣ ΣΥΝΕΤΑΙΡΙΣΜΟΣ ΕΥΡΥΤΕΡΗΣ ΠΕΡΙΟΧΗΣ ΑΜΥΝΤΑΙΟΥ	ΠΕΡΙΦΕΡΕΙΑΚΟ ΑΠΘ / Α. Μουλασιώτης

		ΑΓΡΟΚΤΗΜΑΤΑ ΜΕ ΣΥΓΧΡΟΝΑ ΣΥΣΤΗΜΑΤΑ ΔΙΑΜΟΡΦΩΣΗΣ ΤΩΝ ΔΕΝΔΡΩΝ	3. ΑΠΘ 4. AGRO Q	
7	16.1– 16.2	**DEMOPEACH /** ΑΠΟΔΕΙΚΤΙΚΑ ΚΑΙ ΕΠΙΔΕΙΚΤΙΚΑ ΑΓΡΟΚΤΗΜΑΤΑ ΟΡΓΑΝΩΣΕΩΝ ΠΑΡΑΓΩΓΩΝ: ΜΙΑ ΟΡΓΑΝΩΤΙΚΗ ΚΑΙ ΚΟΙΝΩΝΙΚΗ ΚΑΙΝΟΤΟΜΙΑ ΓΙΑ ΜΙΑ ΜΟΝΙΜΗ ΣΤΡΟΦΗ ΠΡΟΣ ΤΗΝ ΤΕΧΝΟΛΟΓΙΚΗ ΚΑΙΝΟΤΟΜΙΑ	1. ΕΛ.Γ.Ο. 'ΔΗΜΗΤΡΑ' (ΙΕΥΠ ΘΕΡΜΗ) 2. ΑΣΕΠΟΠ ΒΕΛΒΕΝΤΟΥ ΣΥΝ.Π.Ε. 3. ΓΠΑ 4. ΑΠΘ 5. VENUS GROWERS 6. AGRO Q	ΕΘΝΙΚΟ ΓΠΑ
8	16.1– 16.2	**PEACHWALLS /** ΤΑ ΡΟΔΑΚΙΝΑ ΤΗΣ ΗΜΑΘΙΑΣ ΣΕ ΚΑΡΠΟΦΟΡΑ ΤΕΙΧΗ: ΒΙΩΣΙΜΟΙ ΠΑΡΑΓΩΓΟΙ – ΑΝΤΑΓΩΝΙΣΤΙΚΗ ΒΙΟΜΗΧΑΝΙΑ - ΙΚΑΝΟΠΟΙΗΜΕΝΟΙ ΚΑΤΑΝΑΛΩΤΕΣ	1. ΕΛ.Γ.Ο. 'ΔΗΜΗΤΡΑ' (ΙΕΥΠ ΘΕΡΜΗ ΚΑΙ ΙΦΔ) 2. ΑΠΘ 3. VENUS GROWERS 4. Α.Σ.ΝΑΟΥΣΑΣ 5. AGRO Q	ΠΕΡΙΦΕΡΕΙΑΚΟ ΑΠΘ / Α. Μουλασιώτης
9	16.1-16.2	**NITREOS COTTON** Παραγωγή τυποποιημένου βάμβακος με χρήση του ολοκληρωμένου συστήματος γεωργίας ακριβείας NITREOS	1. ΕΛΓΟ - «ΔΗΜΗΤΡΑ»/ΙΕΥΠ ΘΕΡΜΗΣ 2. Αγροτικές Εφαρμογές Ι.Κ.Ε. 3. Open Mellon Εκπαίδευση - Συμβουλευτική – Θερμοκοιτίδα Επιχειρήσεων 4. ΑΓΡΟΤΙΚΕΣ ΕΠΙΧΕΙΡΗΣΕΙΣ ΜΙΚΡ. ΜΟΝΑΣΤΗΡΙΟΥ Γ' ΙΚΕ	ΠΕΡΙΦΕΡΕΙΑΚΟ ΕΛΓΟ / Ασχονίτης
10	16.1-16.5	**NITREOS RICE** Διαχείριση της αζωτούχου λίπανσης σε ορυζώνες με χρήση του ολοκληρωμένου συστήματος γεωργίας ακριβείας NITREOS για την προστασία του υδάτινου περιβάλλοντος	1. ΕΛΓΟ - «ΔΗΜΗΤΡΑ»/ ΙΕΥΠ ΘΕΡΜΗΣ 2. Αγροτικές Εφαρμογές Ι.Κ.Ε. 3. AGROMET Ι.Κ.Ε. 4. ΟΜΑΔΑ ΠΑΡΑΓΩΓΩΝ ΡΥΖΙΟΥ ΑΔΕΝΔΡΟΥ Γ' Ι.Κ.Ε. 5. Θεοφανίδης Παναγιώτης - Παραγωγός	ΕΘΝΙΚΟ ΕΛΓΟ / Ασχονίτης
11	16.1-16.2	**Μεγιστοποιηση κέρδους γεωργικών εκμεταλλεύσεων** Αξιόπιστη εκτίμηση της απόδοσης με χρήση του ολοκληρωμένου συστήματος γεωργίας ακριβείας NITREOS, για την ανάλυση της παραγωγικότητας και	1. Ergoplanning 2. Αγροτικές Εφαρμογές Ι.Κ.Ε. 3. Ομάδα Παραγωγών Αγροτικές Επιχειρήσεις Μεσορράχης Δημητριακών Ι.Κ.Ε. 4. Ομάδα Παραγωγών Αγροτικές Επιχειρήσεις Καμπρούδης Ι.Κ.Ε.	ΠΕΡΙΦΕΡΕΙΑΚΟ Ergoplanning

		προσαρμοστικότητας των ετήσιων καλλιεργειών και τη μεγιστοποίηση του κέρδους των γεωργικών εκμεταλλεύσεων	5. ΕΛΓΟ - «ΔΗΜΗΤΡΑ»/ ΙΕΥΠ ΘΕΡΜΗΣ	
12	16.1-16.2	**Μεγιστοποιηση γεωργικής παραγωγής** Εκτίμηση της απόδοσης των ετήσιων καλλιεργειών με εφαρμογές γεωργίας ακριβείας, για τη βελτιστοποίηση στη λήψη αποφάσεων που αφορούν στη διαχείριση της αναμενόμενης γεωργικής παραγωγής	1. Ergoplanning 2. Αγροτικές Εφαρμογές Ι.Κ.Ε. 3. Ομάδα Παραγωγών Αγροτικές Επιχειρήσεις Φαρσάλων Α' ΙΚΕ 4. Ομάδα Παραγωγών Αγροτικές Επιχειρήσεις Αμπελώνα Β' ΙΚΕ 5. ΕΛΓΟ - «ΔΗΜΗΤΡΑ»/ΙΕΥΠ ΘΕΡΜΗΣ	ΕΘΝΙΚΟ Ergoplanning
13	16.1-16.5	**NITREOSBIO** Αρδευτικός σχεδιασμός και αύξηση της αποτελεσματικότητας χρήσης νερού στην καλλιέργεια βιολογικής μηδικής με τη χρήση δεδομένων παρατήρησης γης και αριθμητικής πρόγνωσης καιρού	1. Open Mellon, Εκπαίδευση - Συμβουλευτική - Θερμοκοιτίδα Επιχειρήσεων 2. Αγροτικές Εφαρμογές Ι.Κ.Ε 3. ΕΛΓΟ - «ΔΗΜΗΤΡΑ» /ΙΕΥΠ ΘΕΡΜΗΣ 4. Αγροτικές Επιχειρήσεις Φάρμα Πλούτος Ι.Κ.Ε.	ΠΕΡΙΦΕΡΕΙΑΚΟ Open Mellon
14	16.1-16.5	**NITREOSAQUATIC** Εκτίμηση των πραγματικών αναγκών σε άζωτο της καλλιέργειας ρυζιού, με εφαρμογές δεδομένων παρατήρησης γης, για τη μείωση της έκπλυσης και της επιφανειακής απορροής αζώτου και την προστασία του υδάτινου περιβάλλοντος	1. Open Mellon, Εκπαίδευση - Συμβουλευτική - Θερμοκοιτίδα Επιχειρήσεων 2. Αγροτικές Εφαρμογές Ι.Κ.Ε 3. ΕΛΓΟ - «ΔΗΜΗΤΡΑ»/ΙΕΥΠ ΘΕΡΜΗΣ 4.Αγροτ.Επιχειρ. Μικρού Μοναστηριού Β' ΙΚΕ	ΠΕΡΙΦΕΡΕΙΑΚΟ Open Mellon
15	16.1-16.2	**ΡΥΖΙ ΑΚΡΙΒΕΙΑΣ** Εφαρμογή πρακτικών γεωργίας ακριβείας στην ορυζοκαλλιέργεια με στόχο την αύξηση της παραγωγής, βελτίωση της ποιότητας του συγκομιζόμενου προϊόντος και μείωση των εισροών	1. EUROAGRO ΑΕ 2. ΕΛΓΟ - «ΔΗΜΗΤΡΑ» /ΙΕΥΠ ΘΕΡΜΗΣ 3. ΟΙΚΟΑΝΑΠΤΥΞΗ Α.Ε. 4. Ομάδα Παραγωγών ΟΡΥΖΩΝΕΣ ΑΞΙΟΥ	ΠΕΡΙΦΕΡΕΙΑΚΟ EUROAGRO ΑΕ
16	16.1-16.2	**NITREOS_STEVIA** Βελτιστοποίηση της άρδευσης με τη χρήση του ολοκληρωμένου συστήματος γεωργίας ακριβείας NITREOS για την αύξηση της παραγωγικότητας και τη μείωση των απωλειών από ασθένειες, στο φυτό στέβια	1. Αγροτικές Εφαρμογές Ι.Κ.Ε 2. ΕΛΓΟ - «ΔΗΜΗΤΡΑ» / ΙΕΥΠ ΘΕΡΜΗΣ 3. Αγροτικός Συνεταιρισμός ΣΤΕΒΙΑ ΕΛΛΑΣ	ΠΕΡΙΦΕΡΕΙΑΚΟ Αγροτικές Εφαρμογές Ι.Κ.Ε
17	16.1-16.5	**ΙΛΥΣ**	1. ECO FOUR ΤΕΧΝΙΚΗ ΠΕΡΙΒΑΛΛΟΝΤΙΚΗ ΜΕΛΕΤΗΤΙΚΗ Ε.Π.Ε.	ΠΕΡΙΦΕΡΕΙΑΚΟ

		Βελτιστοποίηση εφαρμογής ιλύος αστικών λυμάτων σε γεωργικές καλλιέργειες στις περιβαλλοντικές και στις αγρονομικές παραμέτρους της	2. ΕΛΓΟ - «ΔΗΜΗΤΡΑ» / ΙΕΥΠ ΘΕΡΜΗΣ 3. ΟΙΚΟΑΝΑΠΤΥΞΗ Α.Ε. 4. ΑΓΡΟΤΙΚΗ ΕΤΑΙΡΙΚΗ ΣΥΜΠΡΑΞΗ ΘΕΣΣΑΛΟΝΙΚΗΣ-ΑΝΩΝΥΜΗ ΕΤΑΙΡΕΙΑ 5. Αγροτικός Συνεταιρισμός Α Κουφαλίων	ECO FOUR
18	16.1-16.2	**Καινοτόμο φυτωριακό υπόστρωμα** Ανάπτυξη βελτιωμένων τύπων υποστρώματος υψηλής σταθερότητας και γονιμότητας για τη βελτίωση της αντοχής και της ποιότητας της φυτωριακής παραγωγής ανθοκομικών και δενδροκομικών προϊόντων	1. Ergoplanning 2. ΕΛΓΟ - «ΔΗΜΗΤΡΑ» /ΙΕΥΠ ΘΕΡΜΗΣ 3. Q LAB I.K.E 4. Ομάδα Παραγωγών Marathon Plants I.K.E., 5. Γκλαβάκης Ευάγγελος - Παραγωγός	ΕΘΝΙΚΟ Ergoplanning
19	16.1-16.2	**SYKO** Ολοκληρωμένο σύστημα διαχείρισης νωπού και μεταποιημένου σύκου βιολογικής και ολοκληρωμένης γεωργίας με στόχο την αύξηση της εμπορικής αξίας και προώθησής του στη διεθνή αγορά.	1.«ΕΛΓΟ - «ΔΗΜΗΤΡΑ» / **ΙΕΥΠ** ΘΕΡΜΗΣ **ΙΓΒΦΠ**/Τμήμα Φυλλοβόλων Οπωροφόρων Δένδρων ΝΑΟΥΣΑΣ. 2. ΕΚΕΤΑ 3. Αγροτικές Εφαρμογές Ι.Κ.Ε 4. EURICON Ε.Π.Ε. 5. ΓΑΒΑΝΑΣ ΦΙΛΙΠΠΟΣ ΕΠΕ ΑΡΤΟΠΟΙΪΑ – ΖΑΧΑΡΟΠΛΑΣΤΙΚΗ 6. Αγροτικές Επιχειρήσεις Σύκου και Λοιπών Μικρών Καρπών ΙΚΕ	ΕΘΝΙΚΟ ΕΛΓΟ / Σωτηρόπουλος
20	16.1-16.5	**ΑΖΩΤΟΔΕΣΜΕΥΤΙΚΑ ΒΑΚΤΗΡΙΑ** / Αύξηση παραγωγικότητας ελαιώνων, μείωση νιτρορύπανσης και ανάσχεση προσβολής από βερτιτσίλιο με τη χρήση μικροοργανισμών εδάφους	1. ΕΛ.Γ.Ο. ‘ΔΗΜΗΤΡΑ’ (ΙΕΥΠ & ΙΕΛΥΑ) 2. ΔΠΘ 3. ‘ΕΛΑΙΟΚΤΗΜΑ’ 4. SACOMHELLAS επε 5. ΑΙΓΙΛΟΠΑΣ 6. EURICON επε	ΠΕΡΙΦΕΡΕΙΑΚΟ ΕΛΓΟ/ ΧΑΤΖΗΣΤΑΘΗΣ
21	16.1-16.5	**ΑΝΑΣΤΟΛΕΑΣ ΝΙΤΡΟΠΟΙΗΣΗΣ /**	1. ΕΛ.Γ.Ο. ‘ΔΗΜΗΤΡΑ’ (ΙΕΥΠ & ΙΕΛΥΑ) 2. ΓΠΑ	ΕΘΝΙΚΟ

		Συνδυαστική εφαρμογή αναστολέα νιτροποίησης με απόβλητα ελαιουργείων και αζωτούχα λιπάσματα, σε παραγωγικούς ελαιώνες της Χαλκιδικής και της Κρήτης	3. 'ΕΛΑΙΟΚΤΗΜΑ' 4. Α.Ε.Κ.Σ. ΠΑΛΑΙΩΝ ΡΟΥΜΑΤΩΝ ΧΑΝΙΩΝ 5. BASF 6. EURICON επε	ΕΛΓΟ/ ΧΑΤΖΗΣΤΑΘΗΣ
22	16.1-16.5	**ΑΜΠΕΛΩΝΕΣ ΚΕΦΑΛΟΝΙΑΣ** / Εξοικονόμηση νερού και μείωση εισροών Ν στους αμπελώνες της Κεφαλονιάς	1. ΕΛ.Γ.Ο. 'ΔΗΜΗΤΡΑ' / ΙΕΥΠ 2. ΙΟΝΙΟ ΠΑΝΕΠΙΣΤΗΜΙΟ 3. ΓΠΑ 4. Α.Ο.Σ. 'ΡΟΜΠΟΛΑ' ΚΕΦΑΛΟΝΙΑΣ 5. ΑΙΓΙΛΟΠΑΣ 6. ΑΡΓΥΡΙΟΣ ΓΕΡΑΚΗΣ 7. EURICON επε	ΠΕΡΙΦΕΡΕΙΑΚΟ ΕΛΓΟ/ ΧΑΤΖΗΣΤΑΘΗΣ
23	16.1– 16.2	«**ΜΕΙΩΣΗ ΚΟΣΤΟΥΣ ΠΑΡΑΓΩΓΗΣ ΕΛΙΑΣ-ΚΥΚΛΙΚΗ ΟΙΚΟΝΟΜΙΑ ΣΤΗΝ ΕΛΙΑ** / Αξιοποίηση λυμάτων ελαιοτριβείου για παραγωγή βιοαερίου και λίπανση ελαιόδεντρων με χωνεμένο απόβλητο»	1. Ergoplanning Ε.Π.Ε., Θεσσαλονίκη 2. ΕΛΓΟ-ΔΗΜΗΤΡΑ / ΙΕΥΠ Θέρμη 3. Φωτειάδου Φανή, Λευκότοπος Σερρών 4. Μητσιολίδης-Μητσόπουλος-Μποζατζίδης-Τζιάκας Α.Ε., ΒΙΟΕΝΕΡΓΕΙΑ ΝΙΓΡΙΤΑΣ 5. Ομάδα Παραγωγών Αγροτικές Επιχειρήσεις Καλάνδρας Α ΙΚΕ, Χαλκιδική, 6. Πιλιτζίδης Α. & ΣΙΑ Ο.Ε. (Πρότυπο Οικολογικό Ελαιοτριβείο), Λευκότοπος, Αχινός, Σερρών,	ΠΕΡΙΦΕΡΕΙΑΚΟ Ergoplanning
24	16.1-16.5	**SmartSeeder** Σύστημα εναλλαγής καλλιεργειών με χρήση γεωργικού μηχανήματος που κάνει ταυτόχρονη σπορά και διανομή εδαφοβελτιωτικού (χωνεμένου αποβλήτου από βιοαέριο).	1. Ergoplanning Ε.Π.Ε., 2. ΕΛΓΟ-ΔΗΜΗΤΡΑ / ΙΕΥΠ Θέρμη 3. Ομάδα Παραγωγών Αγροτικές Επιχειρήσεις Καλάνδρας Α ΙΚΕ, Χαλκιδική, 4. Τέζας Ιωάννης, Νιγρίτα Σερρών	ΠΕΡΙΦΕΡΕΙΑΚΟ Ergoplanning

			5. Μητσιολίδης-Μητσόπουλος-Μποζατζίδης-Τζιάκας Α.Ε., ΒΙΟΕΝΕΡΓΕΙΑ ΝΙΓΡΙΤΑΣ	
25	16.1-16.5	Εξοικονόμηση αρδευτικού νερού σε καλλιέργεια ρυζιού για την ικανοποίηση της περιβαλλοντικά ελάχιστης παροχής ποταμού.	1. ΕΛΓΟ-ΔΗΜΗΤΡΑ / ΙΕΥΠ Σίνδος 2. Αγροτικός Συνεταιρισμός Αγ. Αθανασίου 3. Αγροτική Εταιρική Σύμπραξη Θεσσαλονίκης Α.Ε. (ΕΑΣΘ)	ΠΕΡΙΦΕΡΕΙΑΚΟ ΕΛΓΟ/ ΔΟΥΛΓΕΡΗΣ
26	16.1-16.5	Πρωτόκολλο γεωργικών πρακτικών στην ελαιοκαλλιέργεια νησιωτικών περιοχών για την αποδοτικότερη χρήση νερού και την αντιμετώπιση της μειωμένης παραγωγικότητας.	1. ΕΛΓΟ-ΔΗΜΗΤΡΑ / ΙΕΛΥΑ Χανιά 2. ΕΛΓΟ-ΔΗΜΗΤΡΑ / ΙΕΥΠ Σίνδος 3. Αγροτική Εταιρική Σύμπραξη Ένωση Μεραμβέλλου Α.Ε. 4. ΚΟΙΝΣΕΠ Μοδούσα 5. Καραβατάκης Παναγιώτης, Επαγγελματίας Αγρότης 6. SCIENTACT A.E	ΕΘΝΙΚΟ ΕΛΓΟ / ΙΕΛΥΑ Κουργιαλάς
27	16.1-16.5	**Good Olive Practices in Mediterranean Islands** Χρήση βάσεων δεδομένων και χαρτών GIS για βελτιστοποίηση εφαρμογών καλλιεργητικών πρακτικών.	1. Αγροτική Εταιρική Σύμπραξη Ένωση Μεραμβέλλου Α.Ε 2. ΕΛΓΟ-ΔΗΜΗΤΡΑ / ΙΕΥΠ Σίνδος 3. ΕΛΓΟ-ΔΗΜΗΤΡΑ / ΙΕΛΥΑ Χανιά 4. ΑΠΘ / Τμήμα Πολιτικών Μηχανικών / Εργαστήριο Γεωδαισίας και Γεωματικής	ΠΕΡΙΦΕΡΕΙΑΚΟ Α.Ε.Σ. Ένωση Μεραμβέλλου Α.Ε

28	16.1 -16.5	**WeeDetect** / Ευφυές σύστημα αναγνώρισης ζιζανίων και εκτίμησης αναγκαιότητας ψεκασμού μέσω δεικτών βιοποικιλότητας	1. **ΕΕΛΓΟ-ΔΗΜΗΤΡΑ** – ΙΕΥΠ / Τμήμα Γεωργικής Μηχανικής και Τμήμα Εδαφολογίας 2. **ΔΠΘ** – Τμήμα Αγροτικής Ανάπτυξης / Εργαστήρο Φαρμακολογίας και Οικο-τοξικολογίας 3. **Farmacon, Λεωνιδάκης & ΣΙΑ ΟΕ** – Γεωργικοί Σύμβουλοι 4. **Αγροτικός Συνεταιρισμός Γιάννουλης** 5. **Αναπτυξιακό Λογιστικό Κέντρο Εξυπηρέτησης Αγροτών (ΑΛΚΕΑ)** – Σύμβουλοι Επιχειρήσεων 6. **Ευσταθίου Χρυσούλα** – Παραγωγός	ΕΘΝΙΚΟ ΕΛΓΟ-ΔΗΜΗΤΡΑ (Κ. Φερεντίνος)
29	16.1–16.2	**Remote Crop Damage** Εκτίμηση ζημιών καλλιεργειών χρησιμοποιώντας Τηλεπισκόπηση και Γεωγραφικά Συστήματα Πληροφοριών	1. ΕΛΓΟ /ΙΕΥΠ ΤΕΑ 2. Συν/σμός Φυτειών Αιτωλοακαρνανίας 3. Τριαντακωνσταντή Γεωργία, αγρότης 4. Τριαντακωνσταντής Θεόδ., αγρότης 5. Τριαντακωνσταντής Δημ., αγρότης 6. Τριαντακωνσταντής Γεώργ., αγρότης	ΠΕΡΙΦΕΡΕΙΑΚΟ ΕΛΓΟ ΔΗΜΗΤΡΑ (Τριαντακωνσταντής Δημήτρης)
30	16.1-16.5	**ΑΣ Ανωγείων Λακωνίας - ΑΣ Φυτειών Αιτωλοακαρνανίας** Διαδικτυακή παροχή συμβουλών για άρδευση και λίπανση στους αγροτικούς συνεταιρισμούς Ανωγείων Λακωνίας και Φυτειών Αιτωλοακαρνανίας	1. Εργαστήριο Γεωργικής Υδραυλικής (Γεωπονικό Πανεπιστήμιο Αθηνών) 2. ΕΛΓΟ / ΙΕΥΠ ΤΕΑ 3. Εταιρεία SCIENTACT 4. Αγροτ. Συν/ρισμός Ελαιοπαραγωγών Ανωγείων 5. Εταιρεία Αγροστήριξη 6. Αγροτικός Συνεταιρισμός Φυτειών «Ακαρνανική Γη»	ΕΘΝΙΚΟ Συμμετοχή Δ. Τριακωνσταντή

31	16.1 -16.5	**SMARTOLEOCLIMA/** Έξυπνο σύστημα διαχείρισης καλλιεργητικών πρακτικών στην ελαιοκαλλιέργεια για την αντιμετώπιση των επιπτώσεων της κλιματικής αλλαγής	1. ΕΛΓΟ ΙΕΥΠ/ΤΕΑ 2. ΤΡΙΧΩΝΙΔΑ ΑΕ-ΑΝΑΠΤΥΞ. ΟΤΑ 3. ΑΓΡΟΤ. ΣΥΝ/ΣΜΟΣ ΝΗΛΕΑΣ 4. ΑΓΡΟΤ. ΣΥΝ/ΣΜΟΣ ΜΟΝΟΠΑΤΙ 5. ΓΕΩΠΟΝΙΚΟ ΠΑΝΕΠ.ΑΘΗΝΩΝ 6. ΠΑΝΕΠΙΣΤΗΜΙΟ ΔΥΤ. ΑΤΤΙΚΗΣ	ΕΘΝΙΚΟ (Βίκτωρας Καββαδίας)
32	16.1 -16.2	**Fishamino/** Καινοτόμος λίπανση με χρήση αμινοξέων από ψυχρή ενζυματική υδρόλυση ψαριών σε καλλιέργεια καρότων	1. ΕΛΓΟ –« ΔΗΜΗΤΡΑ» ΙΕΥΠ/ΤΕΑ, ΤΓΜΚ ΙΤΑΠ 2. HUMOFERT 3. Καλλιεργητής καρότων Προκοπίου	Περιφερειακό (Μονοκρούσος)
33	16.1 -16.2	**Kiwioptimizing/** Ποιοτική και ποσοτική βελτίωση παραγωγής ακτινιδίων με την χρήση καινοτόμων λιπάνσεων	1. ΕΛΓΟ / ΙΕΥΠ ΤΕΑ και ΤΓΜΚ ΙΤΑΠ 2. Humofert 3. ΑΣ Πύρρος 4. NEL (Innovation broker) 5. Γεωπονικό Πανεπιστήμιο Αθηνών	Περιφερειακό (Ευθυμιάδου)
34	16.1 -16.2	**UNIMAXIMIZING/** Ενσωμάτωση στο έδαφος οργανικής ύλης σε καινοτόμο σκεύασμα	1. ΕΛΓΟ • ΙΕΥΠ ΤΕΑ και ΤΓΚΜ • ΙΤΑΠ 2. Greek Farmer 3. ΑΣ ΚΑΒΑΛΑΣ 4. Γεωπονικό Παν Αθηνών	Περιφερειακό (Ευθυμιάδου)
35	16.1 -16.2	**Treexpert/** Βελτιστοποίηση της καλλιέργειας οπωρώνων	1. ΕΛΓΟ “ΔΗΜΗΤΡΑ” ΤΜΗΜΑ ΕΔΑΦΟΛΟΓΙΑΣ ΑΘΗΝΩΝ , Γεωργικών Μηχανημάτων και ΙΤΑΠ 2. Greek Farmer 3. Venus 4. Γεωπονικό Παν Αθηνών	Περιφερειακό (Ευθυμιάδου)

36	16.1 -16.2	**Azolive II/** Εφαρμογή Καινοτόμου καλλιεργητικής τεχνικής εδαφικών μικροβιακών εμβολίων με αζωτοδεσμευτικά βακτήρια σε καλλιέργεια ελιάς	1. ΕΛΓΟ / ΙΕΥΠ/ ΤΕΑ ΤΓΜΚ 2. Γεωπονικό Πανεπιστήμιο Αθηνών 3. Humofert 4. ΕΝΙΑΙΟΣ ΑΓΡΟΤΙΚΟΣ ΣΥΝΕΤΑΙΡΙΣΜΟΣ ΚΕΦΑΛΛΗΝΙΑΣ & ΙΘΑΚΗΣ 5. Αναστάσιος Γεωργαράκης 6. Παναγιώτης Τομαροπανάγος 7. Αριστείδης Χριστόπουλος 8. Γιώργος Λύμπερης	Εθνικό (Ευθυμιάδου)
37	16.1 -16.2	**Azolive /** Εφαρμογή Καινοτόμου καλλιεργητικής τεχνικής εδαφικών μικροβιακών εμβολίων με αζωτοδεσμευτικά βακτήρια σε καλλιέργεια ελιάς	1. ΕΛΓΟ/ ΙΕΥΠ /ΤΕΑ ΤΓΜΚ 2. Γεωπονικό Πανεπιστήμιο Αθηνών 3. Humofert 4. ΑΣ Ομονοιας 5. ΑΣ Αιχμέας 6. NEL (Innovation Broker)	Εθνικό (Ευθυμιάδου)
38	16.1 -16.2	**Citrustec/** Χρήση Ιχνοστοιχείων σε υγρά λιπάσματα για βελτιστοποίηση της οικονομικότητας της καλλιέργειας εσπεριδοειδών	1. ΕΛΓΟ / ΙΕΥΠ / ΤΕΑ ΤΓΜΚ ΙΤΑΠ 2. Γεωπονικό Πανεπιστήμιο Αθηνών 3. Humofert 4. ΑΣ ΔΑΝΑΟΣ ΚΑΣΟΑ 5. Δημητριος Φούντας –Παραγωγός	Εθνικό (Ευθυμιάδου)
39	16.1 -16.2	**DSSvine/** Βελτιστοποίηση της χρήσης νερού άρδευσης στην καλλιέργεια του αμπελιού μέσω σύγχρονου συστήματος υποστήριξης αποφάσεων	1. ΕΛΓΟ ΙΕΥΠ ΤΕΑ ΤΓΜΚ ΙΤΑΠ 2. FARMACON 3. ΑΣ ΜΕΣΣΑΡΑΣ	Εθνικό (Ευθυμιάδου)

			4. ΑΣ Κορυφής	
40	16.1 -16.2	**DSSCotton/** Βελτιστοποίηση της χρήσης νερού άρδευσης στην καλλιέργεια του βαμβακιού μέσω σύγχρονου συστήματος υποστήριξης αποφάσεων	1. ΕΛΓΟ ΙΕΥΠ ΤΕΑ ΤΓΜΚ ΙΤΑΠ 2. Γεωπονικό Πανεπιστήμιο (εργαστήριο Γεωργίας) 3. FARMACON 4. Γεωργικοί Σύμβουλοι (Αλκέα) 5. Ομάδα Βαμβακος Ξυλαγανής (Αν.Μακεδονία & Θράκη) 6. ΟΠ Βάμβακος Καλφούντζος (Θεσσαλία)	Εθνικό (Ευθυμιάδου)
41	16.1 -16.5	**Elaiosafe/** Μοριακό και γεωπληροφοριακό σύστημα διαχείρισης του αγρομικροβιόκοσμου στα πλαίσια των αναγκών της γεωργίας ακριβείας για την ελαιοκαλλιέργεια	1. ΓΠΑ/Εργαστήριο Γενετικής 2. ΕΛΓΟ /ΙΕΥΠ 3. Πανεπιστήμιο Πατρών 4. ΕΠΙ-ΜΑΓΚΝΙΠΙ (Ακαδ. Αθηνών) 5. ΙΒΒΕΑ 6. Μπενακειο 7. Scientact 8. ΑΣ Κεφαλληνίας και Ιθάκης 9. Παραγωγός 10. NEL (innovation broker)	Συμμετοχή Ευθυμιάδου

42	16.1 -16.5	**Figsafe/** Μοριακό και γεωπληροφοριακό σύστημα διαχείρισης του αγρομικροβιόκοσμου στα πλαίσια των αναγκών της γεωργίας ακριβείας για την καλλιέργεια Σύκων	1. ΓΠΑ/Εργαστήριο Γενετικής 2. ΕΛΓΟ /ΙΕΥΠ 3. Πανεπιστήμιο Πατρών 4. ΕΠΙ-ΜΑΓΚΝΙΠΙ(Ακαδημ. Αθηνών) 5. ΙΒΒΕΑ 6. Μπενάκειο 7. Scientact 8. Συνεταιρισμός Σύκων Κύμης 9. Γυναικείος Συν/σμός Αυαλώνα 10. Oxilipro (innovation Broker)	ΕΘΝΙΚΟ Συμμετοχή Ευθυμιάδου
43	16.1 -16.5	**Kiwisafe** Μοριακό και γεωπληροφοριακό σύστημα διαχείρισης του αγρομικροβιόκοσμου στα πλαίσια των αναγκών της γεωργίας ακριβείας για την καλλιέργεια ακτινιδίων	1. ΓΠΑ/Εργαστήριο Γενετικής 2. ΕΛΓΟ /Ινστιτούτο Εδαφουδατικών Πόρων 3. Πανεπιστήμιο Πατρών 4. ΕΠΙ-ΜΑΓΚΝΙΠΙ (Ακαδημία Αθηνών) 5. ΙΒΒΕΑ 6. Μπενάκειο 7. Scientact 8. ΑΣ Πύρρος 9. Παραγωγός Σύκων 10. NEL (innovation broker)	ΕΘΝΙΚΟ Συμμετοχή Ευθυμιάδου
44	16.1 -16.5	**Peachsafe** Μοριακό και γεωπληροφοριακό σύστημα διαχείρισης του αγρομικροβιόκοσμου στα πλαίσια των αναγκών της γεωργίας ακριβείας για την ροδακινιά	1. ΓΠΑ/Εργαστήριο Γενετικής 2. ΕΛΓΟ /ΙΕΥΠ 3. Πανεπιστήμιο Πατρών 4. ΕΠΙ-ΜΑΓΚΝΙΠΙ (Ακαδ. Αθηνών)	ΕΘΝΙΚΟ Συμμετοχή Ευθυμιάδου

			5. ΙΒΒΕΑ 6. Μπενάκειο 7. Scientact 8. ΑΣ Γιάννουλης 9. ΑΣ Αμύνταιο 10. Farmacon (innovation broker)	
45	16.1 -16.5	**Vinesafe** Μοριακό και γεωπληροφοριακό σύστημα διαχείρισης του αγρομικροβιόκοσμου στα πλαίσια των αναγκών της γεωργίας ακριβείας για την αμπελοκαλλιέργεια	1. ΓΠΑ/Εργαστήριο Γενετικής 2. ΕΛΓΟ /ΙΕΥΠ 3. Πανεπιστήμιο Πατρών 4. ΕΠΙ-ΜΑΓΚΝΙΠΙ(Ακαδ. Αθηνών) 5. ΙΒΒΕΑ 6. Μπενάκειο 7. Scientact 8. ΑΣ Αμύνταιο 9. NEL (innovation broker)	ΕΘΝΙΚΟ Συμμετοχή Ευθυμιάδου
46	16.1 -16.5	**Citrusafe** Μοριακό και γεωπληροφοριακό σύστημα διαχείρισης του αγρομικροβιόκοσμου στα πλαίσια των αναγκών της γεωργίας ακριβείας για τα εσπεριδοειδή	1. ΓΠΑ/Εργαστήριο Γενετικής 2. ΕΛΓΟ /ΙΕΥΠ 3. Πανεπιστήμιο Πατρών 4. ΕΠΙ-ΜΑΓΚΝΙΠΙ (Ακαδ. Αθηνών) 5. Scientact 6. ΑΣ ΚΑΣΟΑ 7. Παραγωγός 1 Κρήτη 8. Παραγωγός 2 Κρήτη 9. NEL (innovation broker)	ΕΘΝΙΚΟ Συμμετοχή Ευθυμιάδου
47	16.1 -16.5	**Pistachiosafe**	1. ΓΠΑ/Εργαστήριο Γενετικής 2. ΕΛΓΟ /ΙΕΥΠ	ΠΕΡΙΦΕΡΕΙΑΚΟΣυμμετοχή Ευθυμιάδου

		Μοριακό και γεωπληροφοριακό σύστημα διαχείρισης του αγρομικροβιόκοσμου στα πλαίσια των αναγκών της γεωργίας ακριβείας για την φυστικιά	3. Καλλιεργητής Φιστικιών (Μέγαρα) 4. NEL (innovation broker)	
48	16.1 -16.2	**HP-Apple**/ Αξιοποίηση μήλων Κρήτης βιολογικής γεωργίας για παραγωγή συμπυκνώματος και σταθεροποίηση με τεχνολογία Υπερυψηλής πίεσης	1. ΕΛΓΟ / 2. ΙΤΑΠ 3. ΙΕΥΠ 4. ΑΣ Κρουσώνα 5. Παραγωγοί 6. Ευρωπαϊκη πρόοδος (innovation Broker)	ΠΕΡΙΦΕΡΕΙΑΚΟ Συμμετοχή Ευθυμιάδου
49	16.1 -16.2	**Metagar/** Η ανάδειξη των ιδιαίτερων χαρακτηριστικών του σκόρδου Ξυλαγανής, μέσω της μεταβολομικής διαδικασίας καθώς και εφαρμογής πρωτόκολλου ποιότητας στο τελικό προιόν	1. ΕΛΓΟ/ ΙΤΑΠ ΙΕΥΠ 2. ΓΠΑ/εργαστήριο Γενετικής 3. Δημοκρίτειο Πανεπιστήμιο 4. Ομάδα παραγωγών Ξυλαγανής 5. Αλκέα (Innovation Broker) 6. Farmacon (innovation Broker)	ΠΕΡΙΦΕΡΕΙΑΚΟ Συμμετοχή Ευθυμιάδου
50	16.1 -16.2	**ΘΡΟΥΜΠΕΛΙΑ** Εργαστηριακή αποτύπωση της φυσικής διαδικασίας μετατροπής του ελαιόκαρπου τύπου «Θρούμπας Κρήτης» σε εδώδιμο επιτραπέζιο ελαιόκαρπο χωρίς τη χρήση χημικών ουσιών	1. ΕΛΓΟ/ 2. ΙΤΑΠ 3. ΙΕΥΠ 4. ΑΣ Κρουσώνα 5. Παραγωγοί 6. Ευρωπαϊκη πρόοδος	ΠΕΡΙΦΕΡΕΙΑΚΟ Συμμετοχή Ευθυμιάδου
51	16.1 -16.2	**Avocold /** Εφαρμογή καινοτόμων τεχνολογιών ψυχρής έκθλιψης και ψυχρής παστερίωσης με Υπερυψηλή πίεση για την	1. ΕΛΓΟ/ ΙΤΑΠ ΙΕΥΠ ΙΕΛΥΑ	ΠΕΡΙΦΕΡΕΙΑΚΟ Συμμετοχή Ευθυμιάδου

		παραγωγή και σταθεροποίηση προϊόντων από αβοκάντο και φραγκόσυκο Κρήτης	2. ΑΣ Κορμός (Χανιά) 3. Πετροκόλυμπος Μον. ΙΚΕ. 4. Μινωική Γη	
52	16.1 -16.2	**Osmofig/** Εφαρμογή ωσμωτικής αφυδάτωσης ως προεπεξεργασίας της συμβατικής ξήρανσης σύκων Κύμης για την παραλαβή σταθερών και ποιοτικότερων τελικών προιόντων	1. ΕΛΓΟ/ ΙΤΑΠ ΙΕΥΠ 2. Συνεταιρισμός Αυαλώνος Εύβοιας 3. Oxilipro (Innovation broker) 4. Παραγωγοί	ΠΕΡΙΦΕΡΕΙΑΚΟ Συμμετοχή Ευθυμιάδου
53	16.1 -16.2	**HPRAP/** Εφαρμογή καινοτόμων καλλιεργητικών τεχνικών (γεωργία ακριβείας) καθώς και επεξεργασίας με Υπερυψηλή πίεση για την παραγωγή ποιοτικών προϊόντων από μήλα Πιλαφά.	1. ΕΛΓΟ/ ΙΤΑΠ ΙΕΥΠ 2. Εταιρεία ARCAFROz SA 3. Novafarm (Innovation Broker) 4. Εταιρεία Farmacon 5. Παραγωγοί	ΠΕΡΙΦΕΡΕΙΑΚΟ Συμμετοχή Ευθυμιάδου
54	16.1 -16.5	**Agrierosion/** Εφαρμογή καινοτομικών μεθόδων εντοπισμού και αξιολόγησης του φαινομένου της Διάβρωσης	Farmacon ΕΛΓΟ/ ΙΕΥΠ Αστεροσκοπείο Παραγωγός Κάρπαθος Συνεταιρισμός Λέσβου Μανταμάδο ΑΣ Παλαιοχωρίου ΑΣ Μόριας ΑΣ Παλαιοκήπου	ΕΘΝΙΚΟ Συμμετοχή Ευθυμιάδου

ΠΡΟΤΑΣΕΙΣ ΠΟΥ ΥΠΟΒΛΗΘΗΚΑΝ ΑΠΌ ΤΟ ΙΕΥΠ ΤΗΝ ΠΕΡΙΟΔΟ 2017-2018 (ΠΛΗΝ ΜΕΤΡΟΥ 16)

α/α	ΧΡΗΜΑΤΟΔΟΤΙΚΟ ΜΕΣΟ	Ακρωνύμιο	Τίτλος	Συντονισμός ΕΛΓΟ	Υποβολή
1	HORIZON	MoreSoilWater	Improved soil water management for sustainable crop production at farm and watershed levels	George Arampatzis	8/2017
2	HORIZON	FluidData	A Framework for Large scale distribUted processing of highly Diverse DATA	George Arampatzis/ Vassilios Pisinaras	5/2017
3	ARIMNET2	FERTICHAR	Recovery of olive oil by-products through bio/hydro chars production for agricultural soil fertilization and environment preservation	Charalampos Doulgeris	9/2017
4	ΔΗΜΟΣ ΑΛΕΞΑΝΔΡΟΥΠΟΛΗΣ	ΑΡΙΣΤΗΝΟ	ΕΞΙΔΕΙΚΕΥΜΕΝΗ ΤΕΧΝΙΚΟΕΠΙΣΤΗΜΟΝΙΚΗ ΥΠΟΣΤΗΡΙΞΗ ΤΟΥ ΔΗΜΟΥ ΑΛΕΞΑΝΔΡΟΥΠΟΛΗΣ ΣΤΗ ΔΙΑΧΕΙΡΙΣΗ-ΑΝΑΠΤΥΞΗ ΤΟΥ ΓΕΩΘΕΡΜΙΚΟΥ ΠΟΡΟΥ ΚΑΙ ΣΤΗΝ ΕΦΑΡΜΟΓΗ ΤΩΝ ΕΡΓΩΝ ΕΚΜΕΤΑΛΕΥΣΗΣ	Πασχάλης Δαλαμπάκης	11/2017
5	TAP_CM ENGINEERING SA	ΑΡΙΣΤΗΝΟ	«Μελέτη, επίβλεψη και testing του έργου κατασκευής γεωθερμικής γεώτρησης παραγωγής και testing στο γεωθερμικό πεδίο Αρίστηνου-Αλεξανδρούπολης»	Πασχάλης Δαλαμπάκης	10/2017
6	ΔΕΥΑ ΠΑΓΓΑΙΟΥ	ΑΚΡΟΠΟΤΑΜΟΣ	ΤΕΧΝΙΚΟΕΠΙΣΤΗΜΟΝΙΚΗ ΥΠΟΣΤΗΡΙΞΗ ΣΤΗΝ ΟΡΘΟΛΟΓΙΚΗ ΑΞΙΟΠΟΙΗΣΗ ΚΑΙ ΔΙΑΧΕΙΡΙΣΗ ΤΟΥ ΓΕΩΘΕΡΜΙΚΟΥ ΠΕΔΙΟΥ ΑΚΡΟΠΟΤΑΜΟΥ Ν. ΚΑΒΑΛΑΣ	Πασχάλης Δαλαμπάκης	3/2018
7	CBC MED	Watability	Joint Water Sustainability Plan focusing on water over-abstraction monitoring in the Mediterranean Basin	Andreas Panagopoulos	1/2018
8	HORIZON	CLIMAGRO	CLIMate Resilience for Sustainable AGROecosystems	Andreas Panagopoulos	2/2018

9	PRIMA-S2	GO4LOCAL	Re-scaling management strategies in Mediterranean region to improve effectiveness of water governance and long-term sustainability	Andreas Panagopoulos	3/2018
10	PRIMA-S2	MOSAIC	Modeling and Observing a Mosaic of Processes for Sustainable Water Management in Aquifers and catchments and Implementing Adaptations to Climate and Landuse Changes	Charalampos Doulgeris	3/2018
11	PRIMA-S2	MEDSAL	Salinization of critical groundwater reserves in coastal Mediterranean areas: Identification, risk assessment and sustainable management with the use of integrated modelling and smart ICT tools	Evangelos Tzitritis	3/2018-9/2018
12	PRIMA-S2	MOD4MED	MODeling routines and water management models for the MEDiterranean area	Vassilis Pisinaras	3/2018
13	PRIMA-S2	ORCA	Optimization of water resources availability in the catchment and aquifer scale through novel monitoring and modelling tools	Andreas Panagopoulos	3/2018
14	PRIMA-S1	Reus4Agro	Exploring the untapped potential of non-conventional water resources for reuse in sustainable agriculture	Evangelos Tziritis	5/2018
15	PRIMA-S1	SPDDES	Study and prediction of desalination plant implantation effect and desalination water use on the environment and on soil salinization	Evangelos Tziritis	5/2018
16	Trans Adriatic Pipe	TAP	Ad hoc expert support services on surface and ground water related issues directly or indirectly linked to the TAP construction within the Hellenic territory	Andreas Panagopoulos	6/2018

17	Twinning	WFD Serbia	Support to policy planning in water management sector in Serbia	Andreas Panagopoulos	9/2018
18	HORIZON	ATLAS	AGRICULTUAL INTEROPERABILITY AND ANALYSIS SYSTEM	Andreas Panagopoulos	11/2018
19	ΕΡΕΥΝΩ-ΔΗΜΙΟΥΡΓΩ-ΚΑΙΝΟΤΟΜΩ	Water CS	Ευφυές Ολοκληρωμένο Σύστημα Παρακολούθησης Ποταμών	Ανδρέας Παναγόπουλος	02/2018
20	BALKANMED	RESOURCE	Providing services for management of natural resources	Evangelos Hatzigiannakis-George Arampatzis	08/2018
21	MARIE CURIE	Water Tox	GROUNDWATER EXPOSURE FOR THE ORGANIC COMPOUNDS TOXIC FOR THE ENVIRONMENT AND HUMAN HEALTH	Andreas Panagopoulos	09/2018
22	HORIZON	ECOFarmFood	Enhancing Capacities for Organic Farming and Food	P. Tziachris	11/2017
23	HORIZON	SI4Organic	Sustainable Intensification for Organic Farming Systems: a multidisciplinary approach	P. Tziachris	11/2018

ΠΑΡΑΡΤΗΜΑ Δ΄

ΔΗΜΟΣΙΕΥΣΕΙΣ 2016 - 2018

Σε Διεθνή Επιστημονικά Περιοδικά
2016

1. **Hatzigiannakis E.**, Filintas A., **Ilias A., Panagopoulos A., Arampatzis G.**, Hatzispyroglou I., 2016. Hydrological and Rating Curve Modelling of Pinios River Water Flows in Central Greece, for Environmental and Agricultural Water Resources Management. **Desalination and Water Treatment**, 57 (25): 11639-11659.

   The aim of the present study is a hydrological approach on streamflow modelling, in order to investigate flow velocity, discharge rate, stage, river bed variations and the hydraulic properties (water depth, flow area, wetted perimeter, hydraulic radius and depth, Manning's coefficient of roughness, Froude Number, etc.) of the Pinios River at P145 Giannouli-Larissa monitoring station (Central Greece). Also, the study aims to the compilation–validation of a rating curve (RC) from a series of stage h(t)–discharge Q(t) pairs measurements, in order to use them as tools to assist environmental and agricultural water resources management, support environmental flows estimation, monitoring and irrigation planning in local basin scale. The results and statistical analysis, showed that Froude number during the measurement period oscillated from a minimum 0.109 to maximum 0.283 (mean Fr = 0.172). Therefore, in all cases, Fr < 1 which means that streamflow of the River Pinios, at P145 station is classified as subcritical. The segment's maximum water velocity measured from a minimum 0.452 to maximum 1.693 m s^{-1} (mean 1.247). The mean monthly river discharges of years 1978, 1979 and 2014 were found to be 35.91, 57.52 and 50.37 m^3s^{-1}, respectively. The summer months (June–August) of recent and also of historic years presented low to zero discharges, which are below the environmental flow lower (critical) limit. Moreover, based on the parameters' measurements from 2013 (July) up to 2014 (December), on the modelling analysis, on classification results and on the proposed model performance index (MPI) for each of the eight models tested, the power model was selected as the best to use for the compilation and best fit of the flow RC for this monitoring station. The results of model's validation using two different statistical methods, model simulation, error statistics criteria and the proposed MPI index, were converge to the same output that the data fitting the selected power model for the curve RC(2013–2014) was very satisfactory, and the stability of the developed relationship was robust. The resulted streamflow RC and the extrapolated parts, the rainfall vs. discharge and environmental flows analysis, the river bed variation analysis and the performed hydraulic properties estimates are proposed to serve as hydrological assisting tools for environmental water resources and irrigation management at the study area. These assisting tools will help water authorities accurately and quickly estimate river's water quantities and variation with a minimum cost and effort, and they could be used for irrigation management, environmental flow estimation, groundwater recharge, flood protection and other purposes

2. **Hatzigiannakis E.**, Pantelakis D., Hatzispiroglou I., **Arampatzis G., Ilias A. Panagopoulos** A. 2016. Discharge Measurements and Roughness Coefficient Estimation in a River. The Case of Strymonas River in Northern Greece. **Environ. Process**.

In order to study river flow, the discharge and the channel bed roughness should be estimated. Discharge has been calculated by the continuity equation. The roughness coefficient of the Manning equation has been used with a view to estimate the bed roughness. In the literature, different values of the Manning roughness coefficient are determined for various flow conditions and geometric characteristics of river sections or different Manning roughness coefficient values are derived from calibration of various numerical models. Measurements of the flow velocity, the flow depth and the cross section area have been performed at three sections along the River Strymonas, which is located in the plain of Serres in Northern Greece. Measurements have been made over the three bridges once a month for a period of 16 months. A modern flow meter has been used in order to measure flow velocity. The monitoring results have shown that the variation of the roughness coefficient, considering the river bottom slope stable, with the hydro-geometric characteristics of the flow is noteworthy and the selection of a constant coefficient value for the simulation of the flow in Strymonas river would not be satisfactory.

3. Iatrou M., **Papadopoulos A,** 2016, "*Influence of Nitrogen Nutrition on Nitrate Levels of Strawberry Leaf Blades and Petioles*", **Journal of Plant Nutrition**, Vol. 39(8), pp. 1131 – 1136.
   Hydroponic and field experiments were conducted to assess the optimum nitrogen (N) levels in strawberry leaves for the appropriate management of its N nutrition under field or protected cultivation. Unlike the common view that leaf petiole is the right plant organ to sample for strawberries, the study showed that the leaf blade, of the most recently fully expanded leaf, is more responsive and therefore a better indicator of the N supply changes in the strawberry plant. This was attributed to the distinctive characteristic of strawberry plants to accumulate high concentrations of nitrates in leaf blades when there is luxury consumption of N.

4. Iatrou M., **Papadopoulos A**, 2016, "*Influence of Nitrogen Nutrition on Yield and Growth of an Everbearing Strawberry Cultivar (cv. Evie II)*", **Journal of Plant Nutrition**, Vol. 39 (11), pp. 1499 – 1505.
   Strawberry plants are relatively unresponsive to nitrogen (N) fertilization. Supraoptimal N application also results in excessive vegetative growth, which competes to reproductive growth. Two strawberry field experiments were conducted for two consecutive years using fertigation to investigate the effect of different nitrogen (N) application rates on yield and growth of an everbearing strawberry (cv. Evie II). N was injected weekly into the drip irrigation system at 0, 0.5, 1, 3, and 6 kg N/ha/week the first year and 0, 1, 2, and 3 kg N/ha/week the next year. Fruit yield and fruit number were not affected the first year but were increased the second year due to N application. However, there was no effect of N nutrition on average berry weight for both years. It was concluded that N fertilization may increase yield and fruit number, but average berry weight remains unaffected.

5. **Kavvadias V.,** K. Elaiopoulos, **Sid. Theocharopoulos,** P. Soupios. 2016. Fate of potential contaminants due to disposal of olive mill wastewaters in unprotected evaporation ponds. **Bulletin of Environmental Contamination and Toxicology,** 98: 323.
   The disposal of olive mill wastewaters (OMW) in shallow and unprotected evaporation ponds is a common, low-cost management practice, followed in Mediterranean countries. So far, the fate of potential soil pollutants in areas located near evaporation ponds is not adequately documented. This study investigates the extent in which the long-term disposal of OMW in evaporation ponds can affect the soil properties of the area located outside the evaporation pond and assesses the fate of the pollution loads of OMW. Four soil profiles situated outside and around the down slope side of

the disposal area were excavated. The results showed considerable changes in concentration of soil phenols at the down-site soil profiles, due to the subsurface transport of the OMW. In addition, excessive concentrations of NH4 +, PO4 3− and phenols were recorded in liquid samples taken from inside at the bottom of the soil profiles. It is concluded that unprotected evaporation ponds located in light texture soils pose a serious threat to favour soil and water pollution.

6. **Panagopoulos, A., Arampatzis, G., Tziritis, E., Pisinaras, V.**, Herrmann, F., Kunkel, R., & Wendland, F. (2016). Assessment of climate change impact in the hydrological regime of River Pinios Basin, central Greece. **Desalination and water treatment**, 57(5), 2256-2267.
In order to assess the potential impacts of climate change in the hydrologic regime of River Pinios Basin, an area-differentiated model for total run-off (Qt) estimation based on the GROWA model was applied with bias-corrected precipitation and temperature data from four regional climate models (RCMs) for the projected periods 2020–2050 (period A) and 2050–2080 (period B). Bias correction was performed using the linear scaling approach. As a reference basis, monthly precipitation data from 57 meteorological stations and average temperature data from 17 stations were analyzed for the period 1980–2000. Relative assessments were achieved by comparing reference to projected periods values for Qt, after incorporating bias-corrected projected climate data from the four RCMs driven by several general circulation models (GCMs) as input data to the hydrological model. Results showed that all RCM–GCM combinations lead to a considerable decrease in total run-off with variable rates between the examined projected periods; the greatest reduction of Qt (62%) from the reference period was forecasted for period A (2020–2050), and was simulated when GROWA model ran with input data from HIRHAM5 model driven by ARPEGE GCM, which indicated greater decrements in precipitation and increments in temperature. Regarding the estimations of total run-off for the end of the projected periods (2080) with simulated climatic data input from HIRHAM–ARPEGE, RACMO–ECHAM5 and REMO–ECHAM5 RCM–GCM combinations, a significant adverse impact to the overall water budget is forecasted, as the total amount of Qt is decreased from 46 to 66%. On the contrary, when Qt was simulated with climatic data from RCA4 RCM driven by HadCM3, smoother rates were exhibited due to smaller variations of precipitation and temperature from the reference period and the relevant Qt reduction by the end of the projection (2080) is 22%.

7. **Tziritis E., Arampatzis G., Hatzigiannakis E., Panoras G., Panoras A., Panagopoulos A.** 2016. Quality characteristics and hydrochemistry of irrigation waters from three major olive groves in Greece. **Desalination and Water Treatment** 57, 11582–11591.
Surface and groundwater samples were collected from three key olive grove regions in Greece in order to assess their overall quality and outline major hydrogeochemical characteristics. The three study areas were selected for their significance to the national olive production as well as for their diverse physiographic characteristics and imposed cultivation practices. Results suggest that quality status in general is acceptable with few exceptions; however, issues related with salinization were identified which in turn could potentially lead to environmental degradation. Hydrogeochemical characteristics are affected by geogenic (natural) factors and anthropogenic influences to some extent. Results were confirmed by PoS index which classified samples according to their quality status. Overall, the controlling factors appear to be the geological setup, the hydrogeological regime, as well as the irrational cultivation practices and groundwater overexploitation. Environmental sustainability in the three examined regions is considered feasible on the grounds of a critical balance between environmental protection and production optimization. This balance may be

achieved through the implementation of tailored actions and management measures, designed for each of the three cultivated areas and every plot participating in the study.

Σε Διεθνή Επιστημονικά Περιοδικά 2017

8. Arrouays, D., Leenaars, J. G., Richer-de-Forges, A. C., Adhikari, K., Ballabio, C., Greve, M., **Theocharopoulos S**, & Heuvelink, G. (2017). Soil legacy data rescue via GlobalSoilMap and other international and national initiatives. **GeoResJ**, 14, 1-19.
Legacy soil data have been produced over 70 years in nearly all countries of the world. Unfortunately, data, information and knowledge are still currently fragmented and at risk of getting lost if they remain in a paper format. To process this legacy data into consistent, spatially explicit and continuous global soil information, data are being rescued and compiled into databases. Thousands of soil survey reports and maps have been scanned and made available online. The soil profile data reported by these data sources have been captured and compiled into databases. The total number of soil profiles rescued in the selected countries is about 80 0,0 0 0. Currently, data for 117, 0 0 0 profiles are compiled and harmonized according to GlobalSoilMap specifications in a world level database (WoSIS). The results presented at the country level are likely to be an underestimate. The majority of soil data is still not rescued and this effort should be pursued. The data have been used to produce soil property maps. We discuss the pro and cons of top- down and bottom-up approaches to produce such maps and we stress their complementarity. We give examples of success stories. The first global soil property maps using rescued data were produced by a top-down approach and were released at a limited resolution of 1 km in 2014, followed by an update at a resolution of 250 m in 2017. By the end of 2020, we aim to deliver the first worldwide product that fully meets the GlobalSoilMap specifications.

9. **Aschonitis, V.G.,** Papamichail, D., Demertzi, K., Colombani, N., Mastrocicco, M., Ghirardini, A., Castaldelli, G., Fano, E.-A., 2017. High-resolution global grids of revised Priestley-Taylor and Hargreaves-Samani coefficients for assessing ASCE-standardized reference crop evapotranspiration and solar radiation. **Earth System Science Data**, 9 (2), 615-638. doi: 10.5194/essd-9-615-2017
The objective of the study is to provide global grids (0.5°) of revised annual coefficients for the Priestley-Taylor (P-T) and Hargreaves-Samani (H-S) evapotranspiration methods after calibration based on the ASCE (American Society of Civil Engineers)-standardized Penman-Monteith method (the ASCE method includes two reference crops: short-clipped grass and tall alfalfa). The analysis also includes the development of a global grid of revised annual coefficients for solar radiation (R_s) estimations using the respective Rs formula of H-S. The analysis was based on global gridded climatic data of the period 1950-2000. The method for deriving annual coefficients of the P-T and H-S methods was based on partial weighted averages (PWAs) of their mean monthly values. This method estimates the annual values considering the amplitude of the parameter under investigation (ETo and R_s) giving more weight to the monthly coefficients of the months with higher ETo values (or Rs values for the case of the H-S radiation formula). The method also eliminates the effect of unreasonably high or low monthly coefficients that may occur during periods where ETo and Rs fall below a specific threshold. The new coefficients were validated based on data from 140 stations located in various climatic zones of the USA and Australia with expanded observations up to 2016. The validation procedure for ETo estimations of the short reference crop showed that the P-T and H-S methods with the new revised coefficients outperformed the standard methods reducing the estimated root mean square error (RMSE) in ETo values by 40 and 25%, respectively. The

estimations of Rs using the H-S formula with revised coefficients reduced the RMSE by 28% in comparison to the standard H-S formula. Finally, a raster database was built consisting of (a) global maps for the mean monthly ETo values estimated by ASCE-standardized method for both reference crops, (b) global maps for the revised annual coefficients of the P-T and H-S evapotranspiration methods for both reference crops and a global map for the revised annual coefficient of the H-S radiation formula and (c) global maps that indicate the optimum locations for using the standard P-T and H-S methods and their possible annual errors based on reference values. The database can support estimations of ETo and solar radiation for locations where climatic data are limited and it can support studies which require such estimations on larger scales (e.g. country, continent, world). The datasets produced in this study are archived in the PANGAEA database (https://doi.org/10.1594/PANGAEA.868808) and in the ESRN database (http://www.esrn-database.org or http://esrn-database.weebly.com).

10. **Aschonitis, V.G.,** Castaldelli, G., Lanzoni, M., Merighi, M., Gelli, F., Giari, L., Rossi, R., Fano, E.A., 2017. A size-age model based on bootstrapping and Bayesian approaches to assess population dynamics of Anguilla anguilla L. in semi-closed lagoons. **Ecology of Freshwater Fish**, 26(2), 217-232. doi: 10.1111/eff.12269

A size-age modelling technique is presented for assessing the vital rates, stock and recruitment of eel populations in semi-closed lagoons with fully monitored migration of silver eels. Data for yellow and silver European eels (Anguilla anguilla L.) were obtained in 2011 from the Comacchio lagoon (Italy). The analysis was performed in three steps: (i) correction of yellow eel data, which are affected by the fyke nets selectivity during samplings, (ii) estimation of survival curve, stock, recruitment and metamorphosis rates of the population (calibration using data from 2011) and (iii) validation of the model using the observed amount of silver eel migrating population of the next year. A bootstrap procedure was used to assess the level of uncertainty for each parameter using the 95% intervals of the highest posterior density distribution HPDD (Bayesian approach). The measured abundance of silver eels was 0.56 ind·ha^{-1}, while the yellow eel abundance and recruitment were estimated by the model for 2011 at 8.77 ind·ha^{-1} and 5.99 ind. ha^{-1} respectively. The model performance during validation was satisfactory as the observed total mass of migrating population of 2012 (3777 kg) was inside the 95% HPDD intervals (3197–3839 kg) of model's predictions. The estimated stocks and recruitment were at least ten times lower from the respective estimations of previous studies of 1989 highlighting the crucial conditions of the population. The proposed modelling approach can provide significant information about eel population conditions, facilitating the evaluation of a range of management options in the context of eel conservation plans.

11. **Aschonitis, V.G.**, Castaldelli, G., Lanzoni, M., Rossi, R., Kennedy, C., Fano, E.A., 2017. Long-term records (1781–2013) of European eel (*Anguilla anguilla* L.) production in the Comacchio Lagoon (Italy): evaluation of local and global factors as causes of the population collapse. **Aquatic Conservation: Marine and Freshwater Ecosystems**, 27 (2), 502-520. doi: 10.1002/aqc.2701

Several eel species have undergone extensive declines at both local and global level. The aim of this study was to identify the reasons for the collapse of the European eel (*Anguilla anguilla*) stock in an important area for biodiversity conservation (Comacchio Lagoon, Italy), in order to support the development of eel conservation plans. The records of silver eel catches from Comacchio describe

the total migratory population and cover the period 1781–2013. The data are accompanied by information related to habitat loss and other local factors. The role of local factors on the decline of the local stock was investigated, while additional information from the literature was also used to discuss the effects of global factors (including glass eel harvest for aquaculture, climate–oceanographic changes, habitat loss, pollution and parasitism) on the three eel species *A. anguilla*, *Anguilla japonica* and *Anguilla rostrata*. The records from Comacchio provided significant information about the effects of local factors on the local eel populations in the past. However, the current population collapse, which started in the 1970s, could not be explained by local factors. The literature on global factors suggests that the three eel species are under combined threat from various factors. The correlations between European aquaculture production data compared with the Comacchio yields and published data from other European eel and glass eel fisheries were found to be highly significant. Aquaculture, which depends entirely on wild-caught glass eels, seems to play a key role in the decline of natural stocks. Conservative estimates using FAO data showed that the current numbers of glass eels needed to support aquaculture production in Europe and Asia exceeds 2×10^9 specimens. This requirement, largely supplied by *A. anguilla* glass eels, can explain the decline of eel populations since the glass eel trade has been expanded at an international level.

12. Barzegar, R., Moghaddam, A.A., Soltani, S., Fijani, E., **Tziritis, E.** Kazemian, N. (2017) Heavy Metal(loid)s in the Groundwater of Shabestar Area (NW Iran): Source Identification and Health Risk Assessment. **Exposure and Health**, pp 1-15, DOI:10.1007/s12403-017-0267-5

The aims of this study are to investigate the potential origin of selected heavy metal(loid)s in the Shabestar plain, NW Iran, by means of multivariate statistical techniques (cluster analysis and factor analysis), as well as to determine the dominant factors that affect groundwater quality and to assess the health risk induced by metal(loid)s using the hazard quotients (HQ). Totally, 29 groundwater samples were collected from wells in August 2016, and the values of 23 parameters, namely pH, electrical conductivity, concentration of major elements (Ca^{2+}, Mg^{2+}, Na^{+}, K^{+}, $HCO3^{-}$, $SO4^{2-}$, Cl^{-}), minor elements ($NO3^{-}$, F^{-}, B, and Br^{-}) and heavy metal(loid)s (Fe, Al, Cr, Mn, As, Zn, Pb, Cu, and Ni) were measured. The results indicate that some samples were found with As, Pb, and Zn concentrations exceeding WHO standards for drinking water. Results of correlation coefficients between the measured variables reflect the occurrence of weathering and dissolution of rocks, especially silicates and evaporites, with ion exchange and geochemical characteristics similar to the release of some heavy metal(loid)s. According to hierarchical cluster analysis, samples of cluster 1 are affected by alkalinity and accompanied by elements compatible with alkaline ambience ($CO3^{2-}$ and Ni). Samples of subcluster 2-1 demonstrate the effect of salinity, attributed to evaporates, irrigation return flow, and influx of Urmia Lake's brine, while, samples of sub-cluster 2-2 are influenced by agricultural activities. Factor analysis results illustrate the effects of five factors on the quality of groundwater. The factor analysis accounts for the 71.9% of total variance of groundwater quality for geogenic impacts, while 10% of the groundwater quality variance is controlled by agricultural activities which produce excessive amounts of $NO3^{-}$ along with Zn which is contained in fertilizers and agrochemicals. The results of the human health risk assessment show that As is the most dominant metalloid in inducing maximum noncarcinogenic risk among all the heavy metal(loid)s. Based on HI, 45 and 14% of the samples for children and adults, respectively, are found to be in high risk category.

13. Barzegar, R., Fijani, E., Moghaddam, A.A., **Tziritis, E.** (2017) Forecasting of groundwater level fluctuations using ensemble hybrid multi-wavelet neural network-based models. **Science of the Total Environment** 599-600:20-31, DOI: 10.1016/j.scitotenv.2017.04.189

Accurate prediction of groundwater level (GWL) fluctuations can play an important role in water resources management. The aims of the research are to evaluate the performance of different hybrid wavelet-group method of data handling (WA-GMDH) and wavelet-extreme learning machine (WA-ELM) models and to combine different wavelet based models for forecasting the GWL for one, two and three months step-ahead in the Maragheh–Bonab plain, NW Iran, as a case study. The research used totally 367 monthly GWLs (m) datasets (Sep 1985–Mar 2016) which were split into two subsets; the first 312 datasets (85% of total) were used for model development (training) and the remaining 55 ones (15% of total) for model evaluation (testing). The stepwise selection was used to select appropriate lag times as the inputs of the proposed models. The performance criteria such as coefficient of determination (R^2), root mean square error (RMSE) and Nash-Sutcliffe efficiency coefficient (NSC) were used for assessing the efficiency of the models. The results indicated that the ELM models outperformed GMDH models. To construct the hybrid wavelet based models, the inputs and outputs were decomposed into sub-time series employing different maximal overlap discrete wavelet transform (MODWT) functions, namely Daubechies, Symlet, Haar and Dmeyer of different orders at level two. Subsequently, these sub-time series were served in the GMDH and ELM models as an input dataset to forecast the multi-step-ahead GWL. The wavelet based models improved the performances of GMDH and ELM models for multi-step-ahead GWL forecasting. To combine the advantages of different wavelets, a least squares boosting (LSBoost) algorithm was applied. The use of the boosting multi-WA-neural network models provided the best performances for GWL forecasts in comparison with single WA-neural network-based models.

14. Barzegar, R., Moghaddam, A.A., **Tziritis, E.**, (2017) Hydrogeochemical features of groundwater in Tabriz plain, northwest of Iran. **Applied Water Science** v.7(7), pp 3997-4011, DOI: 10.1007/s13201-017-0550

The present study seeks to evaluate the hydrogeochemistry of Tabriz plain in NW Iran, through major ion chemistry and their spatial variations. In order to accomplish these, groundwater sampling from 30 shallow and deep wells in the plain were carried out in July 2012. The water samples were analyzed for various physicochemical parameters such as pH, EC, Na^+, Ca^{2+}, K^+, Mg^{2+}, Cl^-, $CO3^{2-}$, $HCO3^-$, $SO4^{2-}$ and $NO3^-$. Chadha's diagram demonstrates that most of the groundwaters belonged to the Na–Cl and mixed Ca–Mg–Cl hydrochemical facies. The concentrations of some major ions in groundwater are above the permissible limit for drinking and domestic purposes except for a few locations. The results of saturation index computation show that dissolution of gypsum, anhydrite, halite and silicate minerals occurs frequently across the study area, whereas the groundwater is supersaturated with regard to calcite and dolomite. Cross-plots show that weathering and dissolution of different rocks and minerals, ion exchange, reverse ion exchange and anthropogenic activities, especially agricultural activities, are effective in hydrogeochemistry of the study area.

15. Barzegar, R., Moghaddam, A.A., **Tziritis, E.,** Fakhri, M.S., Soltani, S. (2017) Identification of hydrogeochemical processes and pollution sources of groundwater resources in the Marand plain, northwest of Iran. **Environmental Earth Sciences** 7:296, DOI: 10.1007/s12665-017-6612-y

The main aims of the present study are to identify the major factors affecting hydrogeochemistry of groundwater resources in the Marand plain, NW Iran and to evaluate the potential sources of major and trace elements using multivariate statistical analysis such as hierarchical clustering analysis (HCA) and factor analysis (FA). To achieve these goals, groundwater samples were collected in three sampling

periods in September 2013, May 2014 and September 2014 and analyzed with regard to ions (e.g., Ca2+, Mg+?, Na+ and K?, HCO3-, SO42-, Cl-, F- and NO3-) and trace metals (e.g., Cr, Pb, Cd, Mn, Fe, Al and As). The piper diagrams show that the majority of samples belong to Na–Cl water type and are followed by Ca–HCO3 and mixed Ca–Na–HCO3. Cross-plots show that weathering and dissolution of different rocks and minerals, ion exchange, reverse ion exchange and anthropogenic activities, especially agricultural activities, influence the hydrogeochemistry of the study area. The results of the FA demonstrate that 6 factors with 81.7% of total variance are effective in the overall hydrogeochemistry, which are attributed to geogenic and anthropogenic impacts. The HCA categorizes the samples into two clusters. Samples of cluster C1, which appear to have higher values of some trace metals like Pb and As, are spatially located at the eastern and central parts of the plain, while samples of cluster C2, which express the salinization of the groundwater, are situated mainly westward with few local exceptions.

16. **Chatzistathis**, T., Delviniotis, A., Panagakos, A., Giannakoula, A., Tranaka, V., Molassiotis, A., 2017. Foliar Mn, Zn and B application effects on mineral nutrition of an experimental olive grove (cv. 'Chondrolia Chalkidikis'). **Journal of Plant Nutrition** 40: 1728-1742.

A 6-month field experiment (from October to March) was conducted in a 20-year-old experimental grove of the Aristotle University of Thessaloniki in order to enhance its micronutrient levels and assess the effect of micronutrient foliar application manganese, zinc and boron (Mn, Zn and B) on mineral nutrition, chlorophyll concentration and chlorophyll fluorescence parameters (F_v/F_m, F_v/F_0 and Performance index, PI) of the olive trees (cv. "Chondrolia Chalkidikis"). The experiment consisted of four treatments (Control-C: trees sprayed with deionized water, T50: trees sprayed with 50 mg/L Mn, Zn and B, T100: trees sprayed with 100 mg/L Mn, Zn and B, T200: trees sprayed with 200 mg/L Mn, Zn and B); the three micronutrients were applied in the forms of manganese sulfate ($MnSO_4$), zinc sulfate ($ZnSO_4$) and boric acid (H_3BO_3), respectively. The results showed that the most effective treatment for the enhancement of foliar Mn and B levels was T200, while for the increase of Zn levels was T100. In addition, significant differences among the treatments were recorded for most leaf nutrient concentrations (with the exception of potassium (K), which was not influenced by foliar treatment, the other macronutrients, such as calcium (Ca), magnesium (Mg), phosphorus (P) and nitrogen (N), as well as iron (Fe), obtained their maximum concentrations, at the end of the experiment, in C or T50 treatment). Chlorophyll concentrations were not influenced by foliar treatment. Concerning chlorophyll fluorescence parameters (F_v/F_m, F_v/F_0 and P index), significantly lower values were found in the control (C) trees, compared to the other three treatments, so it seems that a chlorophyll fluorescence technique may be used to detect micronutrient deficiencies in olive groves. However, from all the leaf nutrient concentrations determined, it was found that with the exceptions of: 1) Mn concentrations in the C, T50 and T100 treatments, which were marginal, or slightly deficient; 2) B and Zn concentrations in the C and T50 treatments, which were slightly deficient and marginal, respectively; 3) some K concentrations during the early spring period, which were slightly deficient, all the other concentrations were within the normal levels of sufficiency or within the optimum range, so no serious nutrient deficiency was detected.

17. **Chatzistathis, T.,** Koutsos, T., 2017. Olive mill wastewater as a source of organic matter, water and nutrients for restoration of degraded soils and for crops managed with sustainable systems. **Agricultural Water Management** 190: 55-64.

Every year, worldwide olive oil production produces in a short period of time (late autumn-winter) vast quantities of olive mill wastewater (OMW). This product causes environmental and management problems due to its disposal into rivers and lakes. During the last years, OMW

application (used either as crude, raw material, or as treated- with different methods- product, in order to decrease its phytotoxicity) was tested under field conditions as organic amendment; many times, the results with regard to the raise of plant growth, crop yields and enhancement of soil fertility were promising, while in some other cases phytotoxicity problems, groundwater contamination, decreased soil porosity, as well as enhanced electrical conductivity, salinity, increased soil acidity and decreased N mineralization rate occurred. On the other hand, OMW is a low-cost source of nutrients (especially N, P, K, Mg and Fe), water, and organic matter; thus, it can be successfully used for the restoration of degraded croplands, in hilly, eroded, poor in organic C, and/or semi-arid areas. Since one of the first steps in land restoration process is the enhancement of soil organic C, OMW is an excellent alternative solution for the: i) increase of organic matter, ii) improvement of soil physical properties, and iii) enhancement of productivity of degraded croplands. In addition, under certain conditions (use of treated, or diluted with water OMW in order to decrease phenol content, avoidance of exaggerate applications, suitable application rate(s) and season), OMW can be safely used as a soil amendment and low-cost organic fertilizer for crops, managed with sustainable systems. The basic purpose of this review was to present and thoroughly discuss all the beneficial aspects of OMW application with regard to: i) the restoration of degraded croplands, ii) sustainable crop management, based on the most important and recently published papers. In addition, the environmental consequences of exaggerate and untreated OMW applications, together with some solutions (strategies) adopted for eliminating soil and groundwater contamination and phytotoxicity are also presented in this review article.

18. **Chatzistathis, T.,** Papaioannou, A., Gasparatos, D., Molassiotis, A., 2017. From which soil metal fractions Fe, Mn, Zn and Cu are taken up by olive trees (*Olea europaea* L., cv. 'Chondrolia Chalkidikis') in organic groves? **Journal of Environmental Management 203: 489-499.**

Organic farming has been proposed as an alternative agricultural system to help solve environmental problems, like the sustainable management of soil micronutrients, without inputs of chemical fertilizers. The purposes of this study were: i) to assess Fe, Mn, Zn and Cu bioavailability through the determination of sequentially extracted chemical forms (fractions) and their correlation with foliar micronutrient concentrations in mature organic olive (cv. 'Chondrolia Chalkidikis') groves; ii) to determine the soil depth and the available forms (fractions) by which the 4 metals are taken up by olive trees. DTPA extractable (from the soil layers 0–20, 20–40 and 40–60 cm) and foliar micronutrient concentrations were determined in two organic olive groves. Using the Tessier fractionation, five fractions, for all the metals, were found: exchangeable, bound to carbonates (acid–soluble), bound to Fe-Mn oxides (reducible), organic (oxidizable), as well as residual form. Our results indicated that Fe was taken up by the olive trees as organic complex, mainly from the soil layer 40–60 cm. Manganese was taken up from the exchangeable fraction (0–20 cm); Zinc was taken up as organic complex from the layers 0–20 and 40–60 cm, as well as in the exchangeable form from the upper 20 cm. Copper was taken up from the soil layers 0–20 and 40–60 cm as soluble organic complex, and as exchangeable ion from the upper 20 cm. Our data reveal the crucial role of organic matter to sustain metal (Fe, Zn and Cu) uptake -as soluble complexes-by olive trees, in

mature organic groves grown on calcareous soils; it is also expected that these data will constitute a thorough insight and useful tool towards a successful nutrient and organic C management for organic olive groves, since no serious nutritional deficiencies were found.

19. **Dalampakis, P**., Gelegenis, J., **Ilias, A**., Ladas, A., Kolios, P, 2017: Technical and economic assessment of geothermal soil heating systems in row covered protected crops: A case study from Greece, **Applied Energy**, vol. 203, 201-218.
The application of soil heating can securely transfer the harvest procedure of cultivated plantations to the early or very early season, maximizing in this way the marketable yield and added value. Extended experimentations with geothermal soil heating were elaborated under real operating field conditions based on the running harvest practices and asparagus rows protection techniques. Production and energy data have been collected and processed systematically during the harvest seasons 2002–2007 for direct use of geothermal waters in Neo Erasmio-Xanthi and for the seasons 2006–2016 for low grade shallow energy (heat pumps) applications in Chrysoupoli-Kavala, both in Northern Greece. The application of maximum heating loads in the order of 100–110 kW/ha along with maximum entering water temperatures at 35 _C has been demonstrated as the most cost effective energy option for off season harvest onset. The main objectives of the present comparative approach are (i) the conclusion on a suitable geothermal soil heating scheme for asparagus cultivation and (ii) the quantification and financial evaluation of soil heating impact on asparagus precocity and total yield at commercial scale. The performed analysis gives prominence to low enthalpy and shallow low grade geothermal energy as efficient, valuable and cost effective energy tools in soil heating.

20. Elvanidi, A., Katsoulas, N., Bartzanas, T., **Ferentinos, K.P.**, Kittas, C. 2017. Crop water status assessment in controlled environment using crop reflectance and temperature measurements. **Precision Agriculture**, 18, 332-349. doi: 10.1007/s11119-016-9492-3.
Crop water status is an important parameter for plant growth and yield performance in greenhouses. Thus, early detection of water stress is essential for efficient crop management. The dynamic response of plants to changes of their environment is called ‘speaking plant’ and multisensory platforms for remote sensing measurements offer the possibility to monitor in real-time the crop health status without affecting the crop and environmental conditions. Therefore, aim of this work was to use crop reflectance and temperature measurements acquired remotely for crop water status assessment. Two different irrigation treatments were imposed in tomato plants grown in slabs filed with perlite, namely tomato plants under no irrigation for a certain period; and well-watered plants. The plants were grown in a controlled growth chamber and measurements were carried out during August and September of 2014. Crop reflectance measurements were carried out by two types of sensors: (i) a multispectral camera measuring the radiation reflected in three spectral bands centred between 590–680, 690–830 and 830–1000 nm regions, and (ii) a spectroradiometer measuring the leaf reflected radiation from 350 to 2500 nm. Based on the above measurements several crop indices were calculated. The results showed that crop reflectance increased due to water deficit with the detected reflectance increase being significant about 8 h following irrigation withholding. The results of a first derivative analysis on the reflectance data showed that the spectral regions centred at 490–510, 530–560, 660–670 and 730–760 nm could be used for crop status monitoring. In addition, the results of the present study point out that sphotochemical reflectance index, modified red simple ratio index and modified ratio normalized difference vegetation index could be used as an indicator of plant water stress, since their values were correlated well with the substrate water

content and the crop water stress index; the last being extensively used for crop water status assessment in greenhouses and open field. Thus, it could be concluded that reflectance and crop temperature measurements might be combined to provide alarm signals when crop water status reaches critical levels for optimal plant growth.

21. Evangelides C., **Arampatzis G.** and Tzimopoulos C., 2017. Fuzzy logic regression analysis for groundwater quality characteristics. **Desalination and Water Treatment**, vol 95, 45-50.
Fuzzy logic is applied in many problems that contain uncertainty. Specifically, fuzzy regression analysis can supply useful information about the validity of measured quantities. This article examines the variation of certain quality characteristics of groundwater in boreholes using fuzzy methodology. Traditionally, classical correlation analysis was used to depict the relation between the dependent variable and the independent variables. Classical regression is considered to be probabilistic and has many uses but can be problematic: (a) if the data set is small, (b) if the error distribution is not normal, (c) if there is uncertainty between dependent and independent variables or if linearity acceptance is not proper. For the previous reasons fuzzy regression analysis is preferable. Water was sampled from these boreholes by Institute of Geology and Mineral Exploration from 2005 to 2008 and the concentration spread of Ca, K and Mg ions was examined. Using fuzzy regression, the range of these concentrations was calculated during the period under consideration with inclusion equations and results are presented in graphic form. All the measured values were taken into account in order to obtain an estimation of future measurement accuracy with a confidence level according to historical values and similar regional conditions.

22. Evangelides C., **Arampatzis G.** and Tzimopoulos C., 2017. Soil water diffusivity obtained from visual inspection experiment and comparison with γ-ray measurements. **Desalination and Water Treatment**, vol. 86, 327-331.
Diffusivity is one of the main soil hydraulic properties. It is a critical parameter for the prediction of water transport within the vadose zone. The aim of this paper was to establish the soil water diffusivity of a soil sample using transformed soil moisture profile. Whisler et al. proposed a method, which requires knowledge of the complete soil moisture profile at fixed distances on the soil column. This article uses this method, which is more appropriate nowadays according to the available measuring instruments, for verification purposes. Our laboratory developed a visual method during horizontal experiment, which is simple and takes into consideration profile length observations, sorptivity, initial and final moisture content in order to calculate diffusivity. The method is based on the utilization of a complex empirical function either with four or three constants to generate the transformed soil moisture profile by treating the process as an optimization problem. The required conditions to compute the constants of the empirical function are: (a) the analytically computed sorptivity should agree with the experimental one and (b) the beginning and the end of the transformed soil moisture profile should agree with the final and the initial water content correspondingly. Once an analytic function for the transformed soil moisture profile is determined, then diffusivity is calculated analytically. Integral continuity is preserved throughout the process. The regenerated profiles, which were determined with the visual method, were verified with measured data points from γ-ray measurements during the horizontal absorption experiment and the results were very satisfactory.

23. Evangelos Giannakopoulos, Ioannis K. Kalavrouziotis, Hlias Dimitrelos, Prodromos. H. Koukoulakis, Soterios P. Varnavas, **Frantzis Papadopoulos** ,2017. *"Evaluation of interactions among sewage sludge bioavailable metals from WWTPs using DTPA agent"*,

Desalination and Water Treatment, 71 (2017), pp. 25-31.
The diethylenetriaminepentaacetic acid extractable metal concentration, i.e., of Fe, Zn, Cu, Mn, Cd, Cr, Co, Ni, Pb, in the sewage sludge from six (6) municipal wastewater treatment plants (WWTPs) of Central Greece was evaluated. Also the elemental interactions occurring in the sludge and their quantitative contribution in heavy metals were studied according to the geographical grouping of the WWTPs in coastal and continental zone. Statistical analysis (ANOVA) between elemental interactions and quantification of their contribution in terms of heavy metals showed a significant difference in available metals between the above zones. Based on the quantification data of the interactions elemental contribution, it was found that more heavy metals were contributed to the sludge of the continental zone than to that of the coastal, due to the fact that more antagonistic interactions occurred in the coastal than in the continental zone.

24. Fani Samara, Stavros Sakellariou, Stergios Tampekis, **Dimitrios Triantakonstantis**, Olga Christopoulou. The application of the model of cellular automata (CA) on the island of skiathos, Greece, **Fresenius Environmental Bulletin** 26 (9) 2017, pp. 5551-5555
CA models are systems consisting of blisters - tesserae which interact in a simple manner even though they exhibit a complicated behavior. These models can produce very complex structures and can be used for exploration of an expanded spectrum of fundamental dynamics and development issues. It is an approach for modeling of open, complex and selforganized systems and emphasizes the ways in which local decisions can lead to the creation of global standards. A CA model is a discrete dynamic system in which space is divided into regular territorial cells and time progresses in discrete steps. Each cell in this system receives a state. The state of each cell is updated in accordance with local rules, for example, the state of a cell of a given moment depends on its situation and the situation of adjacent cells in the previous time step. In this paper, we used the thematic maps of 1996 and 2007 for the island of Skiathos for making the forecast for 2020. From the prediction, it was concluded that in 2020 in the island of Skiathos there would be an increase of urban areas and a reduction of the crop areas, the grasslands and the forest areas. These results would be useful for the spatial and environmental Planning of the island.

25. **Ferentinos, K.P.**, Katsoulas, N., Tzounis, A., Bartzanas, T., Kittas, C. 2017. Wireless sensor networks for greenhouse climate and plant condition assessment. **Biosystems Engineering**, 153, 70-81. doi: 10.1016/j.biosystemseng.2016.11.005
Spatially distributed environmental measurements at plant level can be used to create a precise and detailed representation of the climate at various regions inside a greenhouse. Climatic heterogeneity can cause significant differences in terms of yield, productivity, quantitative and qualitative characteristics of the plants, as well as the development of various diseases. This work presents: i) the assessment of wireless sensor networks (WSNs) operation reliability and accuracy in actual greenhouse conditions, ii) the development of a distributed monitoring system using a WSN in a commercial greenhouse, and iii) the analysis of the collected spatially distributed data for the investigation of possible problematic situations for the growing plants caused by climatic heterogeneity inside the greenhouse. A prototype WSN was initially developed in order to investigate the effects of the environmental conditions to the operation reliability of the network and assess its performance and the feasibility of its operation in a commercial greenhouse. The

enhanced WSN was then installed in a commercial greenhouse to investigate the spatial variation of the existing environmental conditions. Analysis based on WSN measurements showed significant spatial variability in temperature and humidity with average differences up to 3.3 ^{o}C and 9% relative humidity and transpiration, with the greatest variability occurring during daytime in the summer period. There were conditions that favoured condensation on leaf surfaces and other problematic situations.

26. Gaglio, M., **Aschonitis, V.G.,** Gissi, E., Castaldelli, G., Fano, E.A., 2017. Land use change effects on ecosystem services of river deltas and coastal wetlands: case study in Volano–Mesola–Goro in Po river delta (Italy). **Wetlands Ecology and Management**, 25 (1), 67-86. doi: 10.1007/s11273-016-9503-1

The landscape of river deltas and coastal wetlands is under a continuous alteration due the combined effects of human and natural factors. The aim of the study is to analyze the Land Use/Land Cover (LULC) changes and associated Ecosystem Services (ESs) of a protected wetland area in the Po river delta (Northern Italy). A combination of methodologies which take into account both the assessment of socio-economic benefits (approach of ESs) and the monitoring of ecosystems attributes (LULC change analysis using transition matrices TMs) were used by comparing the changes observed during two periods (1954–1976 and 1976–2008) described by different environmental protection governance. The period 1954–1976 is described by extensive land reclamations while the period 1976–2008 by significant efforts for applying environmental protection measures. The results highlighted an extensive loss of vegetated wetlands due to direct human interventions (croplands and urban areas expansion) during the first period. The direct human intervention was significantly reduced during the second period. However, vegetated wetlands losses did not follow an analogous reduction probably due to indirect human interventions and natural factors. TMs identified the exact LULC conversions while the ESs approach highlighted the significant economic impact of vegetated wetlands' losses. Waste treatment was the most important ES of the specific system providing approximately 70 % of the estimated natural capital value. The proposed combination of the selected methods (TMs and ESs) provides a detailed description of landscape changes and their economic impact, which can be used as decision support tool for landscape conservation policies.

27. Gaglio, M., **Aschonitis, V.G.,** Mancuso, M.M., Puig, J.P.R., Moscoso, F., Castaldelli, G., Fano, E.A., 2017. Changes in land use and ecosystem services in tropical forest areas: A case study in Andes mountains of Ecuador. International **Journal of Biodiversity Science, Ecosystem Services and Management**, 13 (1), 264-279. doi: 10.1080/21513732.2017.1345980

Tropical Andes are subjected to severe land use/land cover (LULC) changes that significantly alter the capacity of the landscape to provide ecological functions for supporting human well-being. The aim of the study is (a) to investigate the LULC changes in the Ecological Corridor Llaganantes-Sangay (Corredor Ecológico Llanganates-Sangay) (Central Ecuador), a buffer semi-protected area, during the period 2000-2014 and (b) to analyse their possible consequences on ecosystem services (ESs) provision. The analysis was performed using LULC maps of 2000, 2008 and 2014. ESs were analysed using the 'landscape capacity' index, which is based on a multi-criteria assessment framework. The study captured an extremely rapid LULC transition from croplands to pastures during 2008-2014 below the 2000-m altitude, which was followed by a respective rapid socio-economic change of the local society. The landscape index changes were insignificant showing a slight decrease (-1.92%) during 2000-2014. Although the overall coverage of natural ecosystems

slightly increased during 2000-2014, it was found that the passive landscape conservation might not be sufficient to maintain ESs provision. This was justified by the different ESs contribution between forest types but also by urbanization, agriculture abandonment and pasture expansion.

28. Halley JM, **Monokrousos N,** Mazaris AD, Vokou D. (2017). Extinction debt in plant communities: where are we now? **Journal of Vegetation Science** 28, 459-461.
In many ecological communities, extinctions following habitat loss do not happen immediately. Understanding this delay is a major challenge, with conservation implications. In this issue, Otsu et al. show how landscape and management features affect the time lag. With this research as a starting point, we highlight the gaps and challenges still remaining in the study of extinction debt, especially in plant communities.

29. Kalivas, A., Ganopoulos, A., Psomopoulos, F., Grigoriadis, I., Xanthopoulou, A., **Hatzigiannakis, E.,** Osathanunkul, M., Tsaftaris, A., Madesis, P., 2017. Comparative metagenomics reveals alterations in the soil bacterial community driven by N-fertilizer and Amino 16® application in lettuce. Contents lists available at **Science Direct Genomics Data Genomics Data** 14 (2017) 14–17journal homepage: www.elsevier.com/locate/gdata.
Nutrients in the form of fertilizers and/or other additives such as amino acids, dramatically influence plant development and growth, plant nutrient composition and the level of soil pollution. Moreover, the treatment of soil microbiota is emerging as a new strategy in plant breeding to achieve desirable traits. Thus, integrated study of fertilizer application and soil microbiota might lead to a better understanding of soil-plant interactions and inform the design of novel ways to fertilize plants. Herein we report metagenomics data for soil microbiota in lettuce (Lactuca sativa) treated with fertilizer, amino acids or their combinations as follows: N-fertilizer+ Amino16®, Amino16®, N-fertilizer and no treatment control. Data have been deposited in the NCBI Sequence Read Archive (SRA) (accession number: PRJNA388765).

30. Karyoti, A., **Hatzigiannakis, E.,** Bartzialis, D., Danalatos, N., 2017. Spatial Variation Assessment of Selected Soil Properties for Precision Field Experimentation. American Scientific Research Journal for Engineering, **Technology, and Sciences** (ASRJETS). ISSN (Print) 2313-4410, ISSN (Online) 2313-4402 © Global Society of Scientific Research and Researchers. Vol. 35 (1), pp 352-363.
Spatial variation and status of selected soil properties were assessed in a small-sized field, cultivated with irrigated corn. A geo-referenced sampling was performed and twenty four soil samples were collected from two depths (0-30 and 30-60 cm) from 12 different locations in order selected soil properties to be determined. Despite the small parcel size, soil properties exhibited a spatial variability, with coefficient of variance (CV) ranging between 7.0 and15.4% for soil texture, 9.9-12.9% for Cation Exchange Capacity (CEC), 12.8-16.8% for organic carbon (Corg) and 15.7-20.6% for total nitrogen (Ntot). CV for Bulk Density (BD) and pH were very low in both soil depths indicating rather high stability.CEC, Corg and Ntot mean values were higher in the top soils. Increased values for pH, clay and CaCO3 contents in the subsurface samples, may be attributed to partial leaching of exchangeable bases and CaCO3. A strong relation between Ntot and Corg found indicating that these elements are mainly bound in the soil organic matter (SOM). A strong negative relation also was recorded between clay content and bulk density (BD) of soils, indicating that BD depends primary on soil texture. In addition, other soil properties showed very low or absence of correlation between each other. Prediction maps have indicated variation in soil properties partially caused by different farming practices. The interpolated maps showed clear differences mainly on Clay, CaCO3, SOM, Norg. and EC across the surveyed area. Application of a simple ordinary kriging clearly demonstrated the spatial variability of soil properties, which should be taken into consideration for

designing field experiments, particularly when split-plot factorial block designs are to be used. As shown in this investigation, this can be realized with decreased field work, and lower total cost for laboratory analyses.

31. Koubouris G., Kourgialas N.N, **Kavvadias V.,** Digalaki N. & Psarras G. 2017 Sustainable agricultural practices for improving soil carbon and nitrogen content in relation to water availability – an adapted approach to Mediterranean olive groves. **Communications in Soil Science and Plant Analysis,** 48, 2687-2700

A field experiment was conducted in an irrigated olive orchard to determine the effects of an orchard management system consisting of increased carbon input management on spatial distribution (tree inter-row/in-row, soil depth 0–10/10–20 cm) of nitrogen and carbon in the soil as well as on some microbial properties in relation to water availability. The experiment consisted of 12 blocks (each with 4 trees covering 200 m2 of land), uniform olive tree canopy size and natural vegetation, used as replications (three per treatment) in a split plot design for the following four treatments: a) spreading of olive mill compost on the soil without soil tillage, b) spreading of chopped pruning residue on the soil without soil tillage, c) combination of b + c, and d) control which received no organic materials and soil was kept free of weeds with frequent tillage and herbicide sprays. Increased soil organic matter content (SOM) (up to +80%), NO3 N (up to +194%), and NH4 N (up to +37%) by carbon inputs were observed in soil layer 0–10 cm. Irrigation enhanced SOM, NH4 N, and electrical conductivity (EC) while it favored NO3 N increase by carbon inputs. All microbial properties (Soil Basal Microbial Respiration, Soil Microbial Biomass Carbon, and Metabolic quotient) were significantly higher at 0–10 cm in comparison to 10–20 cm depth. This study suggests good agricultural management practices for optimized soil organic carbon (SOC) storage adapted to the typical Mediterranean agroecosystems.

32. Koutsos, T., **Chatzistathis, T.,** Balampekou, E.I., 2018. A new framework proposal, towards a common EU agricultural policy, with the best sustainable practices for the re-use of olive-mill wastewater. **Science of the Total Environment** 622-623: 942-953 (accepted for publication: 6 December 2017).

The disposal of olive mill wastewater (OMW) is a serious environmental issue for the Mediterranean countries. However, there is still no common European legislation on the management and the re-use of OMW in agriculture, in the frame of sustainable crop management and the standards for the safe OMW disposal and re-use are left to be set by each EU country, individually. This review paper presents the most effective and sustainable practices for OMW, (treatment, application and management), which can maximize the benefits of OMW on crops and soils, while minimizing the potential hazards for public health, thus promoting environmental sustainability. The findings of this synthetic work suggest that there is enough information and proven sustainable practices to go ahead with the initial formulation of a new consensual framework, environmentally acceptable, socially bearable and economically viable, that could hopefully help to set the standards for the re-use of olive mil wastewater and can lead to a common EU policy on the management and re-use of OMW.

33. Li, J., Li, L., Wang, H., **Ferentinos, K.P.**, Li, M., Sigrimis, N. 2017. Proactive energy management of solar greenhouses with risk assessment to enhance smart specialisation in China. **Biosystems Engineering**, 155, 10-22. doi: 10.1016/j.biosystemseng.2017.03.007

For better time-allocation of stored energy, the solar greenhouse (SGH) is equipped with some

storage devices designed economically for local weather: wall storage actively managed with energy-store/retrieve fans and Safety Energy (SE which is a solar collector and fully thermally isolated heat tank) designed for non-regular extreme weather. A proactive energy management process, addressing the optimal energy utilisation through dynamic cooperation of the wall and the SE, is presented in this paper. Based on probabilistic weather forecast and a SGH thermal model, found by system identification, the operation set-points are optimised proactively by minimising the plant probable thermal "cost" and weather-related risk in a scheduling period to take pre-emptory action against potential emergencies. The optimisation is formulated in a two-level control scheme. A master problem optimises the primary (wall-soil) storage operation against the expected weather, and a sub-problem operates the SE as a supplement to the limited wall storage in order to create a better indoor environment. The main task of the slave problem manager is to find the optimal SE operation under probable extreme weather to keep reserves to minimise any risk of severe crop loss. The overall optimisation is solved by a hybrid evolutionary algorithm based on a genetic algorithm. The tests show good potential for energy saving and crop cold stress minimisation, as well as great tolerance to forecast errors for most of the cases in Monte-Carlo simulation. The capacity of the proposed realworld system to implement the tested risk management scheme over web "recommendations" satisfies the need to close the loop of an effective Internet of Things (IoT) system, based on the MACQU (Management And Control for QUality) technological platform.

34. Manganaris, G. A., Drogoudi, P., Goulas, V., **Tanou, G**., Georgiadou, E. C., Pantelidis, G. E., … Manganaris, A., 2017. Deciphering the interplay among genotype, maturity stage and low-temperature storage on phytochemical composition and transcript levels of enzymatic antioxidants in prunus persica fruit. **Plant Physiology and Biochemistry**, 119, 189-199. doi: 10.1016/j.plaphy.2017.08.022

The aim of this study was to understand the antioxidant metabolic changes of peach (cvs. 'Royal Glory', 'Red Haven' and 'Sun Cloud') and nectarine fruits (cv. 'Big Top') exposed to different combinations of low-temperature storage (0, 2, 4 weeks storage at 0 °C, 90% R.H.) and additional ripening at room temperature (1, 3 and 5 d, shelf life, 20 °C) with an array of analytical, biochemical and molecular approaches. Initially, harvested fruit of the examined cultivars were segregated non-destructively at advanced and less pronounced maturity stages and qualitative traits, physiological parameters, phytochemical composition and antioxidant capacity were determined. 'Big Top' and 'Royal Glory' fruits were characterized by slower softening rate and less pronounced ripening-related alterations. The coupling of HPLC fingerprints, consisted of 7 phenolic compounds (chlorogenic, neochlorogenic acid, catechin, epicatechin, rutin, quecetin-3-O-glucoside, procyanidin B1) and spectrophotometric methods disclosed a great impact of genotype on peach bioactive composition, with 'Sun Cloud' generally displaying the highest contents. Maturity stage at harvest did not seem to affect fruit phenolic composition and no general guidelines for the impact of cold storage and shelf-life on individual phenolic compounds can be extrapolated. Subsequently, fruit of less pronounced maturity at harvest were used for further molecular analysis. 'Sun Cloud' was proven efficient in protecting plasmid pBR322 DNA against ROO[rad] attack throughout the experimental period and against HO[rad] attack after 2 and 4 weeks of cold storage. Interestingly, a general down-regulation of key genes implicated in the antioxidant apparatus with the prolongation of storage period was recorded; this was more evident for CAT, cAPX, Cu/ZnSOD2, perAPX3 and GPX8 genes. Higher antioxidant capacity of 'Sun Cloud' fruit could potentially be linked with compounds other than enzymatic antioxidants that further regulate peach fruit ripening.

35. Michailidis, M., Karagiannis, E., **Tanou, G.**, Karamanoli, K., Lazaridou, A., Matsi, T., Molassiotis, A., 2017. Metabolomic and physico-chemical approach unravel dynamic

regulation of calcium in sweet cherry fruit physiology. **Plant Physiology and Biochemistry**, 116, 68-79. doi: 10.1016/j.plaphy.2017.05.005

Calcium (Ca2) nutrition has a significant role in fruit physiology; however, the underlying mechanism is still unclear. In this study, fruit quality in response to CaCl2, applied via foliar sprays (Ca2) or/and hydro-cooling water (CaHC), was characterized in 'Lapins' cherries at harvest, just after cold storage (20 days at 0 °C) as well as after cold storage followed by 2 days at 20 °C, herein defined as shelf-life period. Data indicated that pre- and post-harvest Ca2+ applications increased total Ca2+ and cell wall bound Ca2+, respectively. Treatment with Ca reduced cracking whereas Ca + CaHC condition depressed stem browning. Both skin penetration and stem removal were affected by Ca2+ feeding. Also, several color- and antioxidant-related parameters were induced by Ca2+ treatments. Metabolomic analysis revealed significant alterations in primary metabolites among the Ca2+ treatments, including sugars (eg., glucose, fructose), soluble alcohols (eg., arabitol, sorbitol), organic acids (eg.,malate, quinate) and amino acids (eg., glycine, beta-alanine). This work helps to improve our knowledge on the fruit's response to Ca2+ nutrition.

36. **Panagopoulos A., Karyoti A.,** Karyotis Th., Kasaci A., (2017), Water resources monitoring for the implementation of Nitrates Directive (91/676/EEC) in Turkey, **Amer. Scient. Res. Journ. for engin. Tech. and Sciences**, 35:1, pp. 332-341

Statistical analysis was performed on 7,167 groundwater samples and 11,229 surface water samples originating from Turkey's nitrate monitoring network.Results showed significant spatial and temporal variation of nitrates among 81 provinces of the country.In general, surface and groundwater monitoring data have shown that nitrates concentration is relatively low compared to the corresponding values inseveral EU Member States. For the implementation of the Nitrates Directive (91/676/EEC), Nitrates Vulnerable Zones (NVZs) and Potential NVZs have been designated, the latter indicating an increased risk of nitrate pollution. Digital thematic maps were compiled and made available through a dedicated web platform, illustrating the spatial distribution of nitrates concentrations at the 25 river basins of Turkey. Statistical analysisof hydrochemical data from the groundwater monitoring stations showed strong increasing trends of nitrates in ten river basins. Results from the analysis of the respective surface water data have shown a stable situation in thirteen river basins of Turkey.

37. **Panagopoulos, A.**, Herrmann, F., **Pisinaras, V.**, & Wendland, F. (2017). Impact of climate change on irrigation need and groundwater resources in Pinios River Basin. **European Water**, 59, 91-98.

Initially an area-differentiated modelling of groundwater recharge in River Pinios Basin (Greece) was carried out for the reference period 1980–2000 based on the mGROWA model using daily precipitation data from 57 meteorological stations and average temperature data from 17 stations as climatic input data. After checking the plausibility of the related model results the model was applied to assess the impacts of climate change on groundwater recharge. For this purpose bias-corrected projected climate data from an ensemble of climate models driven by several general circulation models for the projected periods 2020–2050 and 2050–2080 have been used as input data. Results of all RCM–GCM combinations indicate a considerable decrease in groundwater recharge with variable rates between the applied projected periods.

38. Papadopoulos, A., Kalivas, D., & **Theocharopoulos, S**. (2017). Spatio-temporal monitoring of cotton cultivation using ground-based and airborne multispectral sensors in GIS environment. **Environmental monitoring and assessment**, *189*(7), 323.

Multispectral sensor capability of capturing reflectance data at several spectral channels, together with the inherent reflectance responses of various soils and especially plant surfaces, has gained major interest in crop production. In present study, two multispectral sensing systems, a ground-based and an aerial-based, were applied for the multispatial and temporal monitoring of two cotton fields in central Greece. The ground-based system was Crop Circle ACS-430, while the aerial consisted of a consumer-level quadcopter (Phantom 2) and a modified Hero3+ Black digital camera. The purpose of the research was to monitor crop growth with the two systems and investigate possible interrelations between the derived well-known normalized difference vegetation index (NDVI). Five data collection campaigns were conducted during the cultivation period and concerned scanning soil and plants with the ground-based sensor and taking aerial photographs of the fields with the unmanned aerial system. According to the results, both systems successfully monitored cotton growth stages in terms of space and time. The mean values of NDVI changes through time as retrieved by the ground-based system were satisfactorily modelled by a second-order polynomial equation (R^2 0.96 in Field 1 and 0.99 in Field 2). Further, they were highly correlated (r 0.90 in Field 1 and 0.74 in Field 2) with the according values calculated via the aerial-based system. The unmanned aerial system (UAS) can potentially substitute crop scouting as it concerns a time-effective, non-destructive and reliable way of soil and plant monitoring.

39. Panayiotou E, Dimou M, **Monokrousos N** (2017). The effects of grazing intensity on soil processes in a Mediterranean protected area. **Environmental Monitoring and Assessment** 189, 441.

We investigated the temporal and among-site differentiation of soil functionality properties in fields under different grazing intensities (heavy and light) and compared them to those found in their adjacent hedgerows, consisting either of wooden shrubs (*Rubus canescens*) or of high trees (*Populus sp*.), during the cold and humid seasons of the year. We hypothesized that greater intensity of grazing would result in higher degradation of the soil system. The grazing factor had a significant effect on soil organic C and N, microbial biomass C, microbial biomass N, microbial activity, and β-glucosidase, while acid phosphatase and urease activity were not found to differ significantly among the management systems. The intensity of grazing affected mostly the chemical properties of soil (organic C and N) and altered significantly the composition of the soil microbial community, as lower C:N ratio of the microbial biomass indicates the dominance of bacteria over fungi in the heavily grazed fields. All estimated biological variables presented higher values in the humid period, although the pattern of differentiation was similar at both sampling times, revealing that site-specific variations were more pronounced than the time-specific ones. Our results indicate that not all C, N, and P dynamics were equally affected by grazing. Management plans applied to pastures, in order to improve soil quality properties and accelerate passive reforestation, should aim at the improvement of soil parameters related primarily to C and secondly to N cycle.

40. Papaioannou, I.K. Kalavrouziotis, P.H. Koukoulakis, **F. Papadopoulos, P. Psoma**, 2017, *"Interrelationships of metal transfer factor under wastewater reuse and soil pollution"*, **Journal of Environmental Management**, http://dx.doi.org/10.1016/j.jenvman.2017.04.008

The transfer of heavy metals under soil pollution wastewater reuse was studied in a Greenhouse experiment using a randomized block design, including 6 treatments of heavy metals mixtures

composed of Zn, Mn, Cd, Co, Cu, Cr, Ni, and Pb, where each metal was taking part in the mixture with 0,10, 20, 30, 40, 50 mg/kg respectively, in four replications. The Beta vulgaris L (beet) was used as a test plant. It was found that the metal transfer factors were statistically significantly related to the: (i) DTPA extractable soil metals, (ii) the soil pollution level as assessed by the pollution indices, (iii) the soil pH, (iv) the beet dry matter yield and (v) the interactions between the heavy metals in the soil. It was concluded that the Transfer Factor is subjected to multifactor effects and its real nature is complex, and there is a strong need for further study for the understanding of its role in metal-plant relationships.

41. Papaioannou, D., Kalavrouziotis, I., Koukoulakis, P., **Papadopoulos, F., Psoma, P.** 2017. Metal fixation under soil pollution and wastewater reuse. **Desalination and Water Treatment**, 65, 43-51. doi: 10.5004/dwt.2017.20283

The relation of heavy metals fixation to their bioavailability, beet plant uptake, plant dry matter yield, and pollution indices was studied under the effect of an artificially polluted soil. The experiment was conducted in a greenhouse, using a randomized block statistical design, including 12 treatments (T1, T2, … T12), each one being composed of a mixture of heavy metal combinations of Zn, Mn, Cd, Co, Cu, Cr, Ni, and Pb, where each metal was participating in the treatment with 0, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20 and 22 mg/kg, respectively. It was found that the results obtained underlined the importance of the elemental interaction's impact on heavy metal fixation and on metal bioavailability, their plant uptake, plant yields, and pollution indices.

42. Papaioannou, D., Kalavrouziotis, I., Koukoulakis, P., **Papadopoulos, F**, 2017. Critical ranges of pollution indices: a tool for predicting soil metal pollution under long-term wastewater reuse. **Toxicological & Environmental Chemistry**, 99 (2), 197-208. doi: 10.1080/02772248.2016.1189555

A greenhouse experiment was conducted in pots, for two years (20152016), in Amaliada, Greece, using a randomized block design, including six treatments with mixtures composed of Zn, Mn,Cd, Co, Cu, Cr, Ni, and Pb, each metal taking part in the mixture at concentrations of 0, 10, 20, 30 40, and 50 mg/kg soil in four replicates each. Beta vulgaris (beet) was used as a test plant. The aim of the experiment was to calibrate the following pollution indices: "pollution load index," "elemental pollution index," "heavy metal load," and "total concentration factor," in order to determine the level of soil pollution under variable levels (low to very high) of metal mixtures. The irrigation of the plants was conducted with treated municipal wastewater based on field capacity and percent wilting point. The above pollution indices were classified into four soil pollution classes, i.e., "optimum," "low," "high" and "very high" on the basis of percent dry matter plant losses.

43. Perruchon, C., Vasileiadis, S., Rousidou, C., Papadopoulou, E., **Tanou, G.,** Samiotaki, M., … Karpouzas, D.G., 2017. Metabolic pathway and cell adaptation mechanisms revealed through genomic, proteomic and transcription analysis of a sphingomonas haloaromaticamans strain degrading ortho-phenylphenol. **Scientific Reports**, 7(1), Art.no. 6449. doi:10.1038/s41598-017-06727-6

Ortho-phenylphenol (OPP) is a fungicide contained in agro-industrial effluents produced by fruit-

packaging plants. Within the frame of developing bio-strategies to detoxify these effluents, an OPP-degrading Sphingomonas haloaromaticamans strain was isolated. Proteins/genes with a putative catabolic role and bacterium adaptation mechanisms during OPP degradation were identified via genomic and proteomic analysis. Transcription analysis of all putative catabolic genes established their role in the metabolism of OPP. The formation of key transformation products was verified by chromatographic analysis. Genomic analysis identified two orthologous operons encoding the ortho-cleavage of benzoic acid (BA) (ben/cat). The second ben/cat operon was located in a 92-kb scaffold along with (i) an operon (opp) comprising genes for the transformation of OPP to BA and 2-hydroxypenta-2,4-dienoate (and genes for its transformation) and (ii) an incomplete biphenyl catabolic operon (bph). Proteomics identified 13 up-regulated catabolic proteins when S. haloaromaticamans was growing on OPP and/or BA. Transcription analysis verified the key role of the catabolic operons located in the 92-kb scaffold, and flanked by transposases, on the transformation of OPP by S. haloaromaticamans. A flavin-dependent monoxygenase (OppA1), one of the most up-regulated proteins in the OPP-growing cells, was isolated via heterologous expression and its catabolic activity was verified in vitro.

44. Soltani, S., Moghaddam, A.A., Barzegar, R., **Tziritis, E.** (2017) Hydrogeochemistry and water quality of the Kordkandi-Duzduzan plain, NW Iran: application of multivariate statistical analysis and PoS index. **Environmental Monitoring and Assessment** 189(9):455, DOI: 10.1007/s10661-017-6171-4

Kordkandi-Duzduzan plain is one of the fertile plains of East Azarbaijan Province, NW of Iran. Groundwater is an important resource for drinking and agricultural purposes due to the lack of surface water resources in the region. The main objectives of the present study are to identify the hydrogeochemical processes and the potential sources of major, minor, and trace metals and metalloids such as Cr, Mn, Cd, Fe, Al, and As by using joint hydrogeochemical techniques and multivariate statistical analysis and to evaluate groundwater quality deterioration with the use of PoS environmental index. To achieve these objectives, 23 groundwater samples were collected in September 2015. Piper diagram shows that the mixed Ca–Mg–Cl is the dominant groundwater type, and some of the samples have Ca–HCO3, Ca–Cl, and Na–Cl types. Multivariate statistical analyses indicate that weathering and dissolution of different rocks and minerals, e.g., silicates, gypsum, and halite, ion exchange, and agricultural activities influence the hydrogeochemistry of the study area. The cluster analysis divides the samples into two distinct clusters which are completely different in EC (and its dependent variables such as Na+, K+, Ca2+, Mg2+, SO42−, and Cl−), Cd, and Cr variables according to the ANOVA statistical test. Based on the median values, the concentrations of pH, NO3−, SiO2, and As in cluster 1 are elevated compared with those of cluster 2, while their maximum values occur in cluster 2. According to the PoS index, the dominant parameter that controls quality deterioration is As, with 60% of contribution. Samples of lowest PoS values are located in the southern and northern parts (recharge area) while samples of the highest values are located in the discharge area and the eastern part.

45. Stamou GP, Konstadinou S, **Monokrousos N**, Mastrogianni A, Orfanoudakis M, Hassiotis C, Menkissoglu-Spiroudi U, Vokou D, Papatheodorou EM (2017). The effects of arbuscular mycorrhizal fungi and essential oil on soil microbial community and N-related enzymes during the fungal early colonization phase. **AIMS Microbiology** 3, 938-959.

The arbuscular mycorrhizal fungi (AMF) and the essential oils are both agents of sustainable agriculture, and their independent effects on the community of free-living soil microbes have been

explored. In a tomato pot experiment, conducted in a sandy loam mixture, we examined the independent and joint effects of inoculation with the fungus *Rhizophagous irregularis* and the addition of *Mentha spicata* essential oil on the structure of the soil microbial community and the activity of soil enzymes involved in the N-cycle, during the pre-symbiosis phase. Plants were grown for 60 days and were inoculated with *R. irregularis.* Then pots were treated with essential oil (OIL) weekly for a period of a month. Two experimental series were run. The first targeted to examine the effect of inoculation on the microbial community structure by the phospholipid fatty acids analysis (PLFAs), and enzyme activity, and the second to examine the effects of inoculation and essential oil addition on the same variables, under the hypothesis that the joint effect of the two agents would be synergistic, resulting in higher microbial biomass compared to values recorded in singly treated pots. In the AMF pots, N-degrading enzyme activity was dominated by the activity of urease while in the non-inoculated ones by the activities of arylamidase and glutaminase. Higher microbial biomass was found in singly-treated pots (137 and 174% higher in AMF and OIL pots, respectively) compared with pots subjected to both treatments. In these latter pots, higher activity of asparaginase (202 and 162% higher compared to AMF and OIL pots, respectively) and glutaminase (288 and 233% higher compared to AMF and OIL pots, respectively) was found compared to singly-treated ones. Soil microbial biomasses and enzyme activity were negatively associated across all treatments. Moreover, different community composition was detected in pots only inoculated and pots treated only with oil. We concluded that the two treatments produced diverging than synergistic effects on the microbial community composition whereas their joint effect on the activity of asparaginase and glutaminase were synergistic.

46. **Tanou G.**, Ziogas V., Molassiotis A., 2017. Foliar nutrition, biostimulants and prime-like dynamics in fruit tree physiology: new insights on an old topic. **Frontiers in Plant Science**, 8, Art.no.75. doi: 10.3389/fpls.2017.00075

Despite the fact that the usage of foliar nutrients has long history, many aspects of fertilization through leaves are still unknown. Herein, we review the current knowledge regarding the canopy fertilization putting special emphasis on Fe nutrition and briefly provide insights into the nanofertilizer technology of the foliar feeding of fruit crops. In addition, this paper discusses the main aspects of the foliar application of biostimulants regarding crucial factors of fruit cropping systems, such as fruit yield/size, tolerance to environmental stresses, and nutrient availability. Also, we specifically discuss the role of hydrogen peroxide (H2O2) and nitric oxide (NO) as priming molecules and their possible cross-talk with biostimulants in fruit tree physiology. Finally, a view of the key issues for future fundamental and applied research in the topic is put forward.

47. **Tanou, G.**, Minas, I.S., Scossa, F., Belghazi, M., Xanthopoulou, A., Ganopoulos, I., … Molassiotis, A., 2017. Exploring priming responses involved in peach fruit acclimation to cold stress. **Scientific Reports**, 7(1), Art.no.11358. doi:10.1038/s41598-017-11933-3

Cold storage of fruit may induce the physiological disorder chilling injury (CI); however, the molecular basis of CI development remains largely unexplored. Simulated conditions of CI priming and suppression provided an interesting experimental system to study cold response in fruit. Peaches (cv. June Gold) at the commercial harvest (CH) or tree-ripe (TR) stages were immediately exposed to cold treatment (40 d, 0 °C) and an additional group of CH fruits were pre-conditioned 48 h at 20 °C prior to low-temperature exposure (pre-conditioning, PC). Following cold treatment, the ripening behaviour of the three groups of fruits was analysed (3 d, 20 °C). Parallel proteomic, metabolomic and targeted transcription comparisons were employed to characterize the response of fruit to CI expression. Physiological data indicated that PC suppressed CI symptoms and induced more

ethylene biosynthesis than the other treatments. Differences in the protein and metabolic profiles were identified, both among treatments and before and after cold exposure. Transcriptional expression patterns of several genes were consistent with their protein abundance models. Interestingly, metabolomic and gene expression results revealed a possible role for valine and/or isoleucine in CI tolerance. Overall, this study provides new insights into molecular changes during fruit acclimation to cold environment.

48. Tímea Szederjesi, **Evangelia Vavoulidou**, Christina Chalkia, László Dányi & Csaba Csuzdi (2017): An annotated checklist of earthworms of Greece (Clitellata: Megadrili), **Zootaxa** 4272(1): 057–082 http://www.mapress.com/j/zt/ 2017 Magnolia Press (ISSN 1175-5334 (online edition)

The earthworm fauna of Greece is reviewed. According to the up-to-date checklist, the earthworm fauna of Greece consists of 67 species and subspecies, of which 59 taxa belong to the family Lumbricidae, three to Megascolecidae, two to Acanthodrilidae and to Ocnerodrilidae and one taxon to the family Criodrilidae. Three species are recorded for the first time from the country: Allolobophora kosowensis kosowensis Karaman, 1968, Amynthas gracilis (Kinberg, 1867) and Eukerria saltensis (Beddard, 1895). Eisenia spelaea var. athenica Černosvitov, 1938 is proposed to be a synonym of Aporrectodea rosea (Savigny, 1826). The earthworm fauna of Greece is characterized by a large number of strict endemic species belonging to the family Lumbricidae (9 taxa), together with the occurrence of another 10 Balkanic endemic species

49. Tsabarducas, V., **Chatzistathis, T.,** Therios, I., Patakas, 2017. A., How N form and concentration affect growth, nutrient accumulation and photosynthetic performance of *Olea europaea* L. (cv. 'Kalamon'). **Scientia Horticulturae** 218: 23-29.

A greenhouse experiment was conducted, in order to study the effect of nitrogen (N) form (NO3−, NH4+, urea, NH4+ + NO3−) and concentration (1, 8 and 16 mM) on growth, mineral nutrition and photosynthetic performance of olive plants (Olea europaea L., cv. 'Kalamon'). Our data indicate that when plants at high supply (16 mM) received urea as N source better growth performance was recorded, compared to the cases olive plants received other N forms; however, at low to medium N supply (1 or 8 mM) better plant growth performance observed when they were fertilized with NO3−–N. Total N uptake at 16 mM was significantly lower when plants received NO3−–N, in comparison to the other N forms. NO3− form at 16 mM resulted in lower total uptake of P, Fe, Mn and Zn, compared to the other treatments. On the other hand, NH4+-N at high N supply (16 mM) resulted in lower total uptake of Ca and Mg. However, significantly higher K uptake was found when plants were treated with NH4+, at high N rate (16 mM). High N supply in the form of NH4+-N significantly inhibited net photosynthetic rate (A), although the chlorophyll fluorescence (as an indicator of the function of PSII) did not significantly differ among the N treatments. In conclusion, urea-N proved to be the most appropriate N form for the mineral nutrition of the olive cultivar 'Kalamon'; thus, it should be preferred as a source of N in olive groves receiving high N fertilizations.

50. Tsakmakis I., Kokkos N., **Pisinaras V.**, Papaevangelou V., **Hatzigiannakis E., Arampatzis G.**, Gikas G., Linker R., Zoras S., Evagelopoulos V., Tsihrintzis V., Battilani A. and Sylaios G., 2017. Operational Precise Irrigation for Cotton Cultivation through the Coupling of Meteorological and Crop Growth Models. **Water Resources Management**, vol 31(1), 563-580. DOI 10.1007/s11269-016-1548-7

In this paper, we tested the operational capacity of an interoperable model coupling system for the irrigation scheduling (IMCIS) at an experimental cotton (*Gossypium hirsutum L.*) field in Northern Greece. IMCIS comprises a meteorological model (TAPM), downscaled at field level, and a water-driven cultivation tool (AquaCrop), to optimize irrigation and enhance crop growth and yield. Both models were evaluated through on-site observations of meteorological variables, soil moisture levels and canopy cover progress. Based on irrigation management (deficit, precise and farmer's practice) and method (drip and sprinkler), the field was divided into six sub-plots. Prognostic meteorological model results exhibited satisfactory agreement in most parameters affecting ET_o, simulating adequately the soil water balance. Precipitation events were fairly predicted, although rainfall depths needed further adjustment. Soil water content levels computed by the crop growth model followed the trend of soil humidity measurements, while the canopy cover patterns and the seed cotton yield were well predicted, especially at the drip irrigated plots. Overall, the system exhibited robustness and good predicting ability for crop water needs, based on local evapotranspiration forecasts and crop phenological stages. The comparison of yield and irrigation levels at all sub-plots revealed that drip irrigation under IMCIS guidance could achieve the same yield levels as traditional farmer's practice, utilizing approximately 32% less water, thus raising water productivity up to 0.96 kg/m^3.

51. **Tziachris, P.**, **Metaxa, E., Papadopoulos, F**., Papadopoulou, M., 2017. Spatial modelling and prediction assessment of soil iron using Kriging interpolation with pH as auxiliary information. **ISPRS International Journal of Geo-Information**, 6 (9), art. no. 283.

In this study, different interpolation techniques are presented, assessed, and compared for the estimation of soil iron (Fe) contents in locations where observations were not available. Initially, 400 soil samples from the Kozani area, which is near Polifitou Lake in northern Greece, were randomly collected from 2013 to 2015 and were analysed in the laboratory to determine the soil Fe concentrations and pH. The soil Fe concentrations were examined for spatial autocorrelation, and semivariograms were used to determine whether pH and Fe exhibited spatial cross correlation. Three interpolation methods, including Ordinary Kriging, Universal Kriging, and Co-Kriging, were applied, and their results were compared with the use of two different cross-validation methods. In the current study, there was evidence of spatial cross correlation of soil Fe and pH for each year, which was subsequently used to improve the interpolation results in locations where there were no measurements. In nearly all cases, Co-Kriging, which takes advantage of the covariance between the two regionalized variables (Fe and pH), outperformed the other interpolation techniques each year.

52. **Tziachris, P.**, Lekakis, E., Zambetoglou, K., **Metaxa, I., Papadopoulos, F**., 2017. A Case Study of the Effects of Sewage Sludge Application on Soil Properties and Heavy Metal Availability in the Thessaloniki Plain (Greece). **Waste and Biomass Valorization**, 8 (5), 1803-1811. doi: 10.1007/s12649-016-9766-z

The amended soils chemical properties as affected by the application of a single dose of sewage sludge were evaluated over a 1-year period. Three soil groups based on their pH values were examined. Data on pH, organic matter, CaCO3, electrical conductivity, exchangeable Ca and Mg, concentration of nine metals (Cd, Co, Cr, Pb, Zn, Ni, Fe, Mn, Cu) and nutrients beforethe application of sewage sludge in 2013 and after the wheat growing period in 2014, were statistically analyzed. Results showed that the application of lime stabilized sewage sludge significantly increased the electrical conductivity, CaCO3 and Mg in all soil groups as well as Ph and Ca of acidic soils, while the organic matter was not affected. The levels of concentrations of most DTPA-extractable metals

in soil, either decreased or remained the same as they were before the sludge application. Soil Zn was the only metal that increased in the acidic soil group, however in concentrations largely below ecotoxicological limits. It is concluded that the application of lime stabilized sewage sludge to soils may take place with no risk of increasing heavy metal bioavailability to phytotoxic levels. Further benefits to crops are provided by favoring pH conditions for plant growth in acidic soils and by improving plant nutrition via nitrogen addition.

53. **Tziritis, E.**, and Lombardo, L. (2017) Estimation of intrinsic aquifer vulnerability with index-overlay and statistical methods. The case of eastern Kopaida, central Greece. **Applied Water Science** 7:2215-2229, DOI 10.1007/s13201-016-0397-0

The intrinsic vulnerability of a karstic aquifer system in central Greece was jointly assessed with the use of a statistical approach and PI method, as a function of topography, protective cover effectiveness and the degree to which this cover is bypassed due to flow conditions. The input data for the index-overlay PI method were derived from field works and 71 boreholes of the area; the information was obtained, subsequently its critical factors were compiled which included lithology, fissuring and karstification of bedrock, soil characteristics, hydrology, hydrogeology, topography and vegetation. The aforementioned parameters were processed jointly with the aid of a GIS and yielded the final estimation of intrinsic aquifer vulnerability to contamination. Results were compared with an equivalent spatially distributed probability map obtained through a stochastic approach. The calibration and test phase of the latter relied on morphometric conditions derived by terrain analyses of a digital elevation model as well as on geology and land use from thematic maps. This procedure allowed taking into account the topographic influences with respect to a deep system such as the local karstic aquifer of eastern Kopaida basin. Finally, results were validated with ground truth nitrate values obtained from 41 groundwater samples, highlighted the spatial delineation of susceptible areas to contamination in both cases and provided a robust tool for regional planning actions and water resources management schemes.

54. **Tziritis, E**., Datta, P.S., Barzegar, R. (2017) Characterization and assessment of groundwater resources in a complex hydrological basin of central Greece (Kopaida basin) with the joint use of hydrogeochemical analysis, multivariate statistics and stable isotopes. **Aquatic Geochemistry** 23(4):271-298 DOI:10.1007/s10498-017-9322-x

Combined assessments from different methodologies, including hydrogeochemical analysis, multivariate statistics and stable isotopes, were used in order to characterize the groundwater resources of a heterogeneous aquifer system in central Greece and to evaluate the overall environmental regime. Results outlined the driving factors that chiefly control groundwater chemistry and delineated the major pathways of groundwater flow. Following the results of the combined assessments, hydrogeochemistry is influenced both by geogenic and anthropogenic factors including the geological substrate, intense agricultural activities and ongoing geochemical processes which impact the concentrations of redox sensitive agents like NO3, Fe, Mn and SO4. Stable isotope evaluations supplemented the above assessments by providing critical information for the hydrodynamics of the heterogeneous aquifer system. Evaporation is the main factor influencing the isotopic composition of water resources, in addition to the slow percolation rates of the thick unsaturated zone. Comparisons between δ18O and δD values for surface and groundwater samples revealed an interaction among water systems through the developed karstic network and/or the riverbeds of higher permeabilities. Eventually, the integrated conceptual approach of diverse methodologies was applied successfully for the identification of hydrogeological and hydrogeochemical assessments in the case of Kopaida basin; evaluations were cross-confirmed

and supplemented when needed, hence providing essential information for strategic planning and water resources management.

55. Ziogas, V., **Tanou, G.,** Belghazi, M., Diamantidis, G., Molassiotis, A., 2017. Characterization of β-amino- and γ-amino butyric acid-induced citrus seeds germination under salinity using nanoLC–MS/MS analysis. **Plant Cell Reports**, 36(5), 787-789. doi: 10.1007/s00299-016-2063-2

The impact of four elicitors, namely hydrogen peroxide (H2O2), β-amino butyric acid (BABA), γ-amino butyric acid (GABA) and hydrogen sulfide (H2S) donor, sodium hydrosulfide (NaHS), in citrus seed germination under salinity (150 mM NaCl) was tested. The germination potential was adversely affected by NaCl-alone treatment. Pretreatment with H2O2 or the NaHS-H2S donor prior to salinity had no significant effect in germination process, however, BABA and GABA substantially improved seed acclimation to salinity, as evidenced by increased germination percentage and radicle length. Total soluble proteins of radicle and cotyledons were separated by 1DE SDS-PAGE and proteins zones were analyzed by mass spectrometry. In total, 27 and 3 proteins were identified in radicle and cotyledons, respectively. The identified proteins mainly include redox-regulated enzymes (i.e., glutathione S-transferase, dehydroascorbate reductase, Mn-superoxide dismutase, glutathione peroxidase), energy-related proteins (i.e., isocitrate lyase, malate synthase, pyruvate decarboxylase), stress proteins (i.e., stress-related protein, miraculin, thaumatin, disulfide isomerase), storage proteins (i.e., vicilin, Pis v 1 allergen 2S albumin) and transcriptional regulators (i.e., MarR family transcriptional regulator, MADS544 protein). Pretreatments with BABA or GABA altered the accumulation of protein zones exclusively corresponding to citrin, indicating that this protein may serve as a marker for salinity acclimation in citrus seeds.

Σε Διεθνή Επιστημονικά Περιοδικά 2018

56. Avtzis DN., Stara K, Sgardeli V, Betsis A, Diamandis S, Healey JR, Kapsalis E, Kati V, Korakis G, Marini Govigli V, **Monokrousos N**, Muggia L., Nitsiakos V, Papadatou E, Papaioannou H, Rohrer A, Tsiakiris R, Van Houtan KS, Vokou D., Wong J, Halley JM (2018). **Quantifying the conservation value of Sacred natural Forests. Biological Conservation** 222, 95-103.

Many have asserted that Sacred Natural Sites (SNS) play an important role in nature protection but few have assessed their conservation effectiveness for different taxa. We studied sacred groves in Epirus, NW Greece, where a large number of such SNS have been identified. Based on historical, ethnographic and ecological criteria, we selected eight of these groves and matching control sites and in them we studied fungi, lichens, herbaceous plants, woody plants, nematodes, insects, bats and passerine birds. Our results reveal that the contribution of SNS to species conservation is nuanced by taxon, vegetation type and management history. We found that the sacred groves have a small conservation advantage over the corresponding control sites. More specifically, there are more distinct sets of organisms amongst sacred groves than amongst control sites, and overall biodiversity, diversity per taxonomic group, and numbers of species from the European SCI list (Species of Community Interest) are all marginally higher in them. Conservationists regard the often small size of SNS as a factor limiting their conservation value. The sizes of SNS around the globe vary greatly, from a few square meters to millions of hectares. Given that those surveyed by us (ranging from 5 to 116 ha) are at the lower end of this spectrum, the small conservation advantage

that we testified becomes important. Our results provide clear evidence that even small-size SNS have considerable conservation relevance; they would contribute most to species conservation if incorporated in networks.

57. **Arampatzis G., Hatzigiannakis E.,** Kourgialas N., Psarras G., **Kinigopoulou V., Panagopoulos A**. and Koubouris G., 2018. Seasonal variation and implications of soil water content in the cultivation of olive trees. **Acta Horticulturae** Number 1199, 339-343.
Olive tree cultivation has been traditionally a fundamental basis of rural economy and a characteristic landscape feature of Mediterranean countries, forming a particular agro-ecosystem. Today, it becomes necessary to come up with integrated approaches for the cultivation of olive trees, adopting best practices and improvement plans that are customized for specific soil, microclimatic and plantation characteristics. One of the most critical factors for olive tree growth and yields is the soil water content. In this paper, seasonal variation and implications of soil water content at various depths (10, 20, 30 and 40 cm) in the root zone on olive fruit yield were examined. This study was performed in two areas of Greece, one at Merambello in eastern Crete with hot-summer Mediterranean climate (Csa) and the other at Trifilia in south west Peloponnese with wet Mediterranean climate (Csa). The soil water content was systematically monitored in twelve fields at each area, for a three years period (2013 – 2015). For each area, six irrigated and six rainfed groves were employed and measurements of soil moisture and olive fruit yield were comparatively assessed. Additionally, the average values of soil water content in the root zone are presented for every year and for two periods every year, one period is from May to October (dry period requiring irrigation) and the other from November to April (rainfall period). Soils in Trifilia area were classified as medium soil and in Merambello as medium and less of them as heavy soil. The average soil water content in Trifilia area was about 30% at irrigated fields and 27% at rainfed fields in the examined period (cm3 cm-3). Additionally, the average soil water content in Merambello area was about 21% at irrigated fields and 20% at rainfed fields in the examined period.

58. **Arampatzis G., Hatzigiannakis E., Panagopoulos A., Karyoti A., Vrouchakis I. and Karyotis Th.**, 2018. Water scarcity and inputs of nutrients from irrigation in olive groves of.Crete Island, Greece. **Journal of Plant Nutrition**, http://www.tandfonline.com/action /showCitFormats?doi= 10.1080/01904167.2018.1500589
Water availability is an important factor for irrigated agriculture in the Mediterranean countries, because it affects significantly crop production. Surface soil samples were collected in Merambelo area located in Eastern Crete and analyzed. High values for exchangeable potassium and magnesium values were recorded and can be attributed to intensive fertilization and soil heredity factors. Groundwater quality based on two sampling campaigns performed during two irrigation periods. Three different scenarios were taken into account regarding the height of water application by means of irrigation. The contribution and the effects of nutrients and micronutrients from irrigation water to the soil was calculated, on the basis of the mean determined concentrations and the volume of applied irrigation. Significant variation was recorded in most soil properties, and these differences may be attributed to different mobility of nutrients, erosion factors, fertilization practices, and hydraulic soil properties

59. **Arampatzis, G., Hatzigiannakis, E., Pisinaras, V**., Kourgialas, N., Psarras, G., **Kinigopoulou, V., Panagopoulos, A.**, & Koubouris, G. (2018). Soil water content and olive

tree yield responses to soil management, irrigation, and precipitation in a hilly Mediterranean area. **Journal of Water and Climate Change**, 9(4), 672-678.

Olive trees constitute one of the most dynamic cultivations for Mediterranean countries, while their economic importance is high. As water constitutes a fundamental factor affecting olive tree production, soil water content is a most critical parameter that must be monitored to improve olive trees' cultivation management. Effects of precipitation, irrigation, and soil management on water content in four soil depths (10, 20, 30, 40 cm), four periods of the year (February–March, April–May, June–July, August–September) and three successive years were determined in 12 Mediterranean olive groves (Trifilia, southern Greece) as well as their respective fruit and olive oil yields. Significantly higher soil water content was recorded in the first (+16.8%) and third (+27.4%) year compared to the second year. Higher (+6.8%) water content was observed in irrigated olive groves compared to rainfed fields. Higher (+5.6%) water content was observed in sustainable olive groves compared to intensively managed fields. Significantly, higher soil moisture was recorded at 40 and 30 cm depth compared to 10 cm depth while intermediate values were observed at 20 cm. Marked increase in fruit yield was achieved through sustainable management (+39%) compared to intensive olive groves. The potential to improve irrigation practices in the area was also indicated by results of the present study.

60. **Arampatzis, G., Panagopoulos, A., Pisinaras, V., Tziritis, E.**, & Wendland, F. (2018). Identifying potential effects of climate change on the development of water resources in Pinios River Basin, Central Greece. **Applied Water Science**, 8(2), 51.

The aim of the present study is to assess the future spatial and temporal distribution of precipitation and temperature, and relate the corresponding change to water resources' quantitative status in Pinios River Basin (PRB), Thessaly, Greece. For this purpose, data from four Regional Climate Models (RCMs) for the periods 2021–2100 driven by several General Circulation Models (GCMs) were collected and bias-correction was performed based on linear scaling method. The bias-correction was made based on monthly precipitation and temperature data collected for the period 1981–2000 from 57 meteorological stations in total. The results indicate a general trend according to which precipitation is decreasing whilst temperature is increasing to an extent that varies depending on each particular RCM–GCM output. On the average, annual precipitation change for the period 2021–2100 was about − 80 mm, ranging between − 149 and + 35 mm, while the corresponding change for temperature was 2.81 °C, ranging between 1.48 and 3.72 °C. The investigation of potential impacts to the water resources demonstrates that water availability is expected to be significantly decreased in the already water-stressed PRB. The water stresses identified are related to the potential decreasing trend in groundwater recharge and the increasing trend in irrigation demand, which constitutes the major water consumer in PRB.

61. **Aschonitis, V.G.,** Awe, G.O., Abegunrin, T.P., Demertzi, K.A., Papamichail, D.M., Castaldelli, G., 2018. Geographic segmentation, spatial dependencies, and evaluation of the relative position of rain-gauges based on gridded data of mean monthly precipitation: Application in Nigeria. **Hydrology Research**, 49 (1), 107-122. doi: 10.2166/nh.2016.095

The aim of the study is to present a combination of techniques for (a) the spatiotemporal analysis of mean monthly gridded precipitation datasets and (b) the evaluation of the relative position of the existing rain-gauge network. The mean monthly precipitation (P) patterns of Nigeria using ~1 km^2 grids for the period 1950-2000 were analyzed and the position of existing rain-gauges was evaluated. The analysis was performed through: (a) correlations of P versus elevation (H), latitude

(Lat) and longitude (Lon); (b) principal component analysis (PCA); (c) Iso-Cluster and maximum likelihood classification (MLC) analysis for terrain segmentation to regions with similar temporal variability of mean monthly P; (d) use of MLC to create reliability classes of grid locations based on the mean clusters' characteristics; and (e) analysis to evaluate the relative position of 33 rain-gauges based on the clusters and their reliability classes. The correlations of mean monthly P versus H, Lat, Lon, and PCA highlighted the spatiotemporal effects of the Inter Tropical Discontinuity phenomenon. The cluster analysis revealed 47 clusters, of which 22 do not have a rain-gauge while eight clusters have more than one rain-gauge. Thus, more rain-gauges and a better distribution are required to describe the spatiotemporal variability of P in Nigeria

62. **Aschonitis, V.G.**, Diamantopoulou, M., Papamichail, D., 2018. Modeling plant density and ponding water effects on flooded rice evapotranspiration and crop coefficients: critical discussion about the concepts used in current methods. **Theoretical and Applied Climatology**, 132, 1165-1186. doi: 10.1007/s00704-017-2164-z

The aim of the study is to propose new modeling approaches for daily estimations of crop coefficient K_c for flooded rice (Oryza sativa L., ssp. indica) under various plant densities. Non-linear regression (NLR) and artificial neural networks (ANN) were used to predict K_c based on leaf area index LAI, crop height, wind speed, water albedo, and ponding water depth. Two years of evapotranspiration ET_cmeasurements from lysimeters located in a Mediterranean environment were used in this study. The NLR approach combines bootstrapping and Bayesian sensitivity analysis based on a semi-empirical formula. This approach provided significant information about the hidden role of the same predictor variables in the Levenberg-Marquardt ANN approach, which improved K_c predictions. Relationships of production versus ET_c were also built and verified by data obtained from Australia. The results of the study showed that the daily $K_c$values, under extremely high plant densities (e.g., for $LAI_{max} > 10$), can reach extremely high values ($K_c > 3$) during the reproductive stage. Justifications given in the discussion question both the K_c values given by FAO and the energy budget approaches, which assume that ET_ccannot exceed a specific threshold defined by the net radiation. These approaches can no longer explain the continuous increase of global rice yields (currently are more than double in comparison to the 1960s) due to the improvement of cultivars and agriculture intensification. The study suggests that the safest method to verify predefined or modeled K_c values is through preconstructed relationships of production versus ET_c using field measurements.

63. **Aschonitis, V.G.,** Gavioli, A., Lanzoni, M., Fano, E.A., Feld, C., Castaldelli, G., 2018. Proposing priorities of intervention for the recovery of native fish populations using hierarchical ranking of environmental and exotic species impact. **Journal of Environmental Management**, 210, 36-50. doi: 10.1016/j.jenvman.2018.01.006

The freshwater populations of native fish species (Ns) have reached critical levels in many parts of the world due to combined habitat deterioration by human interventions and exotic fish species (Es) invasions. These alarming conditions require combined and well-designed interventions for restoring environmental quality and restricting Es invasion. The aim of the study is to propose a method to design spatially explicit priorities of intervention for the recovery of Ns populations in highly impacted freshwater systems by exotic multi-species invasion and water quality (WQ) degradation. WQ and Es are used as Ns descriptors, which require intervention. The method uses gradient analysis (ordination method of Canonical Correspondence Analysis) for assessing the weights of Ns descriptors' effects, which are further used to develop weighted severity indices; the severity index of WQ (Swq) and Es invasion (Se), respectively. Swq and Se are further merged to one combined total severity index St. The proposed method provides a) a ranking of the sites, based on the values

of S_t, which denotes the priority for combined intervention in space and can be visualized in maps, b) a ranking of the most important Ns descriptors for each site to perform site-specific interventions, and c) Es rankings based on their potential threat on Ns for species-specific interventions. WQ, Es and Ns data from 208 sampling sites located in the Emilia-Romagna Region (Northern Italy) were used as a case study for the presentation of the proposed method. The application of the method showed that the north and northwestern lowland areas of Emilia-Romagna region presented the higher priority for intervention since the Ns of these areas are the most impacted from combined Es invasions and WQ degradation. Specific Es belonging to cyprinids, which are mostly responsible for the decline of aquatic vegetation and the increase of water turbidity, and a top Es predator (Wels catfish) were mostly present in these areas. Additionally, the most important WQ stressors of Ns were found to be COD, BOD and temperature that are all connected to oxygen depletion. The aforementioned conditions in the areas described by high priority for intervention can be used as a basis for the development of specific Ns conservation practices targeting the containment of the most harmful Es, the restoration of aquatic vegetation and the improvement of oxygen conditions.

64. Barzegar, R., Moghaddam, A.A., Deo, R., Fijani, E. **Tziritis, E.** (2018) Mapping groundwater contamination risk of multiple aquifers using multi-model ensemble of machine learning algorithms. **Science of the Total Environment** 621: 697-712,https://doi.org/10.1016/j.scitotenv.2017.11.185

Constructing accurate and reliable groundwater risk maps provide scientifically prudent and strategic measures for the protection and management of groundwater. The objectives of this paper are to design and validate machine learning based-risk maps using ensemble-based modelling with an integrative approach. We employ the extreme learning machines (ELM), multivariate regression splines (MARS), M5 Tree and support vector regression (SVR) applied in multiple aquifer systems (e.g. unconfined, semi-confined and confined) in the Marand plain, North West Iran, to encapsulate the merits of individual learning algorithms in a final committee-based ANN model. The DRASTIC Vulnerability Index (VI) ranged from 56.7 to 128.1, categorized with no risk, low and moderate vulnerability thresholds. The correlation coefficient (r) and Willmott's Index (d) between NO3 concentrations and VI were 0.64 and 0.314, respectively. To introduce improvements in the original DRASTIC method, the vulnerability indices were adjusted by NO3 concentrations, termed as the groundwater contamination risk (GCR). Seven DRASTIC parameters utilized as the model inputs and GCR values utilized as the outputs of individual machine learning models were served in the fully optimized committee-based ANN-predictive model. The correlation indicators demonstrated that the ELM and SVR models outperformed the MARS and M5 Tree models, by virtue of a larger d and r value. Subsequently, the r and d metrics for the ANN-committee based multi-model in the testing phase were 0.8889 and 0.7913, respectively; revealing the superiority of the integrated (or ensemble) machine learning models when compared with the original DRASTIC approach. The newly designed multi-model ensemble-based approach can be considered as a pragmatic step for mapping groundwater contamination risks of multiple aquifer systems with multi-model techniques, yielding the high accuracy of the ANN committee-based model.

65. Bempelou, E., Kiousi, M., Anagnostopoulos, C., Malatou, P., Liapis, K., **Kavvadias**, V., Ioannou, Z., **Theocharopoulos, S.,** N. Papadopoulos, N., Koulousis, N., & **Mavragannis**., V., 2018. Monitoring of pesticide residues in citrus fruits and soil properties under the framework of the developing of an integrated pest management strategy (IPMS) for the sustainable management for the control of medfly (*Ceratitis capitata*) LIFE BIODELEAR (LIFE13

ENV/GR/000414) Integrated Control in Citrus Fruit Crops IOBC-WPRS Bulletin Vol. 132, 2018 pp. 186-191.

LIFE BIODELEAR is 5-year project which foresees to the development of an Integrated Pest Management Strategy (IPMS) for the sustainable control of medfly (Ceratitis capitata) using the mass trapping technique with the novel no toxic attractant Biodelear. The implementation of LIFE BIODELEAR is being performed in the area of Campos, in the island of Chios, Greece, and foresees to a medfly protection strategy that is replicable and scalable with regards to intensively cultivated Mediterranean areas. Among the main objectives of the project is the elimination of insecticide use and the investigation of the effects of conventional and alternative cultivated practices, related to the protection from Med fly, on soil fertility and quality. During the first three years, 900 citrus fruit samples have been sampled according to Directive 91972/2003/EC. All samples have been analyzed with a multiresidue analytical method capable of analyzing 334 pesticides and 18 plant growth regulators. The main pesticides determined so far were the insecticides chlorpyrifos, deltamethrin and spirotetramat, while no residues of plant growth regulators were determined. In a total of four samplings both preparatory and confirmatory residue analysis has been achieved and the fingerprint of the experimental areas as far as pesticide residues are concerned has been depicted. In addition, soil samplings campaign took place in the pilot fields in the area of Campos, before the application of medfly attractants. Soil samples were collected at depth increments of 0-30 cm and 30-60 cm. Samples were subjected to main physicochemical analysis. The results showed high concentrations of DTPA-Zn in surface soil (0-30 cm) as well as excess DTPA-Cu, particularly in soil depth 30-60 cm, indicating the use of copper-containing fungicidal sprays. The regular use of fungicides can potentially pose a risk to the environment, particularly if residues persist in the soil or migrate off-site and enter waterways. High levels of soluble anions (NO3-, Cl-, PO4-3 and SO4-2) were also registered in soil of citrus groves due to inappropriate nutrient management practices. Under the frame of LIFE BIODELEAR, the development of a sustainable IPMS foresees the decrease of pesticide residues, and in combination with soil quality indicators will contribute to the control of medfly due to the use of Biodelear attractant and finally to the recovery of citrus ecosystem services.

66. Brown, A.R., Petropoulos, G.P., **Ferentinos, K.P.** 2018. Appraisal of the Sentinel-1 & 2 use in a large-scale wildfire assessment: A case study from Portugal's fires of 2017. **Applied Geography**, 100, 78-89. doi: 10.1016/j.apgeog.2018.10.004

The recent launch of Sentinel missions offers a unique opportunity to assess the impacts of wildfires at higher spatial and spectral resolution provided by those Earth Observing (EO) systems. Herein, an assessment of the Sentinel-1 & 2 to map burnt areas has been conducted. Initially the use of Sentinel-2 solely was explored, and then in combination with Sentinel-1 and derived radiometric indices. As a case study, the large wildfire occurred in Pedrógão Grande, Portugal in 2017 was used. Burnt area estimates from the European Forest Fires Information System (EFFIS) were used as reference. Burnt area was delineated using the Maximum Likelihood (ML) and Support Vector Machines (SVMs) classifiers, and two multi-index methods. Following this, burn severity was assessed using SVMs and Artificial Neural Networks (ANNs), again for both standalone Sentinel-2 data and in combination with Sentinel-1 and spectral indices. Soil erosion predictions were evaluated using the Revised Universal Soil Loss Equation (RUSLE) model. The effect of the land cover derived from CORINE operational product was also evaluated across the burnt area and severity maps. SVMs produced the most accurate burnt area map, resulting a 94.8% overall accuracy and a Kappa coefficient of 0.90. SVMs also achieved the highest accuracy in burn severity

levels estimation, with an overall accuracy of 77.9% and a kappa of 0.710. From an algorithmic perspective, implementation of the techniques applied herein, is based on EO imagery analysis provided nowadays globally at no cost. It is also robust and adaptable, being potentially integrated with other high EO data available. All in all, our study contributes to the understanding of Mediterranean landscape dynamics and corroborates the usefulness of Sentinels data in wildfire studies.

67. Carmelo Dazzi, Wim Cornelis, Edoardo A.C. Costantini, Mihail Dumitru, Michael A. Fullen, Donald Gabriels, Raimonds Kasparinskis, Adam Kertész, Giuseppe Lo Papa, Guenola Pérès, Jane Rickson, José L. Rubio, Thomas Sholten, **S. Theocharopoulos**, Ivan Vasenev (2018). The contribution of the European Society for Soil Conservation (ESSC) to scientific knowledge, education and sustainability. **Int. Soil and Water Conservation Research**, https://doi.org/10.1016/j. iswcr.2018.11.003

Soil is an integral component of the global environmental system which supports the quality and diversity of terrestrial life on Earth. Therefore, it is vital to consider the processes and impacts of soil degradation on society, especially on the provision of environmental good sand services, including food security and climate change mitigation and adaptation. Scientific societies devoted to soil science play significant roles in reducing soil degradation and promoting soil conservation by advancing scientific knowledge, education and environmental sustainability. The ESSC was founded on 4 November 1988 ,with the aims to:

1.Support research on soil degradation, soil protection and soil and water conservation.

2. Provide a network for the exchange of knowledge about soil degradation processes and soil conservation research and practises.

3.Produce publications on major issues relating to soil degradation and soil and water conservation.

4. Advise regulators and policy-makers on soil issues, especially soil degradation, protectionand conservation. The societal challenges that can be addressed through better soil protection, advancing knowledge and scientific approaches to soil protection and sustainable management, mean the ESSC embraces the on-going development, application, review and constructive criticism of highly innovative scientific soil conservation methods. In this context, the ESSC analyses and publicizes the roles and functions of soil in natural and human-modified systems and the functional optimization of soils to ensure sustainable environmental protection.

68. Castaldelli, G., **Aschonitis, V.,** Vincenzi, F., Fano, E.A., Soana, E., 2018.The effect of water velocity on nitrate removal in vegetated waterways. **Journal of Environmental Management**, 215, 230-238. doi: 10.1016/j.jenvman.2018.03.071

The extended networks of canals and ditches in agricultural landscapes provide high buffer capacity towards nitrogen (N) excess. Their N mitigation potential depends on several biotic and abiotic factors, among which water velocity is poorly explored and generally omitted from the parameterization of this remarkable ecosystem service. The present work reports new insights on the role of flow velocity in regulating N removal via denitrification in sediments colonized by Phragmites australis. Denitrification was investigated in outdoor mesocosms in the presence and absence of P. australis and over a small range of flow velocity (0–6 cm s^{-1}) typical of low-gradient water bodies. Simultaneous measurements of NO_3^- consumption and N_2 production based on analyses of N_2:Ar by Membrane Inlet Mass Spectrometry were undertaken. Vegetated sediments were found more efficient in converting NO_3^- to N_2 via microbial-mediated denitrification (27–233 mmol N m^{-2} d^{-1}) than bare sediments (18–33 mmol N m^{-2} d^{-1}). Vegetation provides multiple interfaces, i.e. in the rhizosphere and on epiphytic biofilms, that support the development and activity

of bacterial communities responsible for NO_3^- dissipation. NO_3^- removal and denitrification rates exhibited one order of magnitude raise when water velocity passed from 0 to 6 cm s^{-1} in vegetated sediments. Indeed, in slow-flow vegetated waterways denitrification may be physically limited and the increase of water velocity enhances the rate of NO_3^- supply through the diffusive boundary layer, thereby promoting its consumption and loss from the system. Water velocity should be taken into account as a key factor for management and restoration actions aimed at maximizing the NO_3^- buffer capacity of low-flow drainage networks.

69. Colson, D., Petropoulos, G.P., **Ferentinos, K.P.** 2018. Exploring the potential of Sentinels-1 & 2 of the Copernicus mission in support of rapid and cost-effective wildfire assessment. International **Journal of Applied Earth Observations and Geoinformation**, 73, 262-276. doi: 10.2166/wcc.2018.090

The present study explores the use of the recently launched Sentinel-1 and -2 data of the Copernicus mission in wildfire mapping with a particular focus on retrieving information on burnt area, burn severity as well as in quantifying soil erosion changes. As study area, the Sierra del Gata wildfire occurred in Spain during the summer of 2015 was selected. First, diverse image processing algorithms for burnt area extraction from Sentinel-2 data were evaluated. In the next step, burn severity maps were derived from Sentinel-2 data alone, and the synergy between Sentinel-2 & Sentinel-1 for this purpose was evaluated. Finally, the impact of the wildfire to soil erodibility estimates derived from the Revised Universal Soil Loss Equation (RUSLE) model implemented to the acquired Sentinel images was explored. In overall, the Support Vector Machines (SVMs) classifier obtained the most accurate burned area mapping, with a derived accuracy of 99.38%. An object-based SVMs classification using as input both optical and radar data was the most effective approach of delineating burn severity, achieving an overall accuracy of 92.97%. Soil erosion mapping predictions allowed quantifying the impact of wildfire to soil erosion at the studied site, suggesting the method could be potentially of a wider use. Our results contribute to the understanding of wildland fire dynamics in the context of the Mediterranean ecosystem, demonstrating the usefulness of Sentinels and of their derived products in wildfire mapping and assessment.

70. **Chatzistathis, T.,** 2018. Physiological importance of Manganese, Cobalt and Nickel and the improvement of their uptake and utilization by plants. In: **Plant Micronutrient Use Efficiency, Molecular and Genomic Perspectives in Crop Plants**. Eds. Anwar Hossain, M., Kamiya, T., Burritt, D.J., Phan Tran, L.-S., Fujiwara, T.

Manganese (Mn) is one of the most important essential micronutrients for plant metabolism and growth, and especially for photosynthesis. It activates more than 35 enzymes and affects root growth. Manganese is taken up by plants as Mn2+, or as organic complex in calcareous soils. Both Mn uptake and utilization efficiency (MnUE) are influenced by genotype and rootstock. On the other hand, Nickel (Ni) is also an essential micronutrient for urea assimilation and N metabolism. Urease is an essential enzyme for urea assimilation in plants, and in cases of Ni deprivation its activity is decreased. In addition, glutamine synthetase is also involved in urea and N metabolism and it is influenced by Ni availability. Nickel is usually taken up as Ni2+. Finally, although Cobalt (Co) is not an essential plant metabolism nutrient, it is considered as a beneficial element, participating in symbiotic N fixation. It is taken by plants as Co2+. The physiological roles of Ni, Mn, and Co for plant metabolism and growth, their uptake, together with the utilization efficiency, and transport mechanisms for crop plants are fully presented and discussed in this review.

71. Dichala O., Therios I., Koukourikou-Petridou M., **Papadopoulos A.**, **2018**, "Nickel Effect on Pomegranate Cracking, Nutrient Accumulation and Biochemical Parameters of Pomegranate Peel**", HortScience,** Vol.53(11), pp. 1677-1682.
A field experiment was conducted in a pomegranate (*Punica granatum* L.) orchard of the well-known cultivars Wonderful and Acco, located in the farm of Aristotle University. The trees were sprayed, every 15 days from flowering (April) to fruit maturation (September), with solutions containing 0, 25, 50, 100 μM Ni, and 100 μM Ni + 100 μM B prepared with $Ni(NO_3)_2 \cdot 6H_2O$ and boric acid. Leaves and fully ripe fruits were initially sorted into cracked and uncracked ones, then further separated into peel and seeds, sampled, and analyzed. Nickel sprays were effective in controlling fruit splitting as well as Ca and Mg concentration of fruit peels. The correlation between cracking level and Ni concentration in solution was linear and negative. Cracking percentage with 50 μM Ni was lower in 'Wonderful', whereas no difference was recorded between the cultivars in the remaining treatments. Leaves had the smallest Ni concentration compared with fruit peel and seeds. Calcium concentration of pomegranate peels was higher than that of control peel at 50 μM Ni in 'Wonderful'. Concerning 'Acco', the treatments 25 μM Ni, 50 μM Ni, and 100 μM Ni + 100 μM B reduced Ca concentration, compared with control. 'Wonderful' fruit peel contained more phenolics than 'Acco'. The treatments 25, 50, and 100 μM Ni increased significantly the flavonoid concentration of fruit peels. The antioxidant capacity ferric-reducing antioxidant potential (FRAP) was linearly increased with Ni concentration in solution in 'Wonderful', whereas in 'Acco' it decreased at 25 and 50 μM Ni. Our data indicates that improving Ni nutrition of pomegranate can potentially reduce crop loss due to cracking and modified phenol and flavonoid concentration and FRAP value of fruit peel.

72. **Doulgeris, Ch.** and Argyroudi, A., 2018. Contribution to decision-making on establishing the maximum water level for Lake Vegoritida. **Lakes and Reservoirs**, 23, 1-13, https://doi.org/10.1111/lre.12249
The water level in Lake Vegoritida, Greece, has undergone great changes in the past decades caused by severe water abstraction directly from the lake and its catchment, affecting not only the conditions of natural environment, but also the social and economic ones. Nowadays, the water level of the lake is rising and a discussion about the decision for the lake's maximum water level becomes a source of conflict among stakeholders. In this paper, a framework for a participatory management plan is proposed with the perspective of engaging all levels of stakeholders in the process of deciding and establishing the maximum water level of the lake. Kolb's learning cycle is used as a methodological vehicle towards the proposed process of participatory decision-making. The contribution to decision-making includes (a) the identification of stakeholders and the issues that arise through a potential establishment of a maximum water level and (b) the suggestion of three water level scenarios to raise a future constructive discussion associated to the establishment of maximum water level in Lake Vegoritida.

73. Eisenbach, L., Folina A., Zisi C., Roussis I., Tabaxi I., Papastylianou P., Kakabouki I., **Efthimiadou A.**, Bilalis D., 2018. Effect of biocyclic humus soil on yield and quality parameters of sweet potato. Scientific papers. Series A. **Agronomy,** Vol.LXI, No.1.
A field experiment was conducted on sweet potato (Ipomoea batatas L.) at the Agricultural University

of Athens during the growing summer season 2017 to evaluate the effects of biocyclic humus soil on plant growth, yield as well as chemical constituents and quality parameters. The experiment was laid out in completely randomized design (CRD) with three replications of three treatments (untreated, inorganic fertilizer and biocyclic humus soil). A two-leaf cutting was placed into the treated soil to make a sweet potato plant. The highest sweet potato yield was obtained by using biocyclic humus soil with average total yield (35.6 t/ha) and average marketable yield (24.3 t/ha). There were no statistically significant differences between the treatments for the compression (Max Load 0.622-0.780 kN) and the penetration (Max Load 0.0439-0.0447 kN) tests on sweet potato tubers. Furthermore, measurements were implemented for the total nitrogen content of tubers with no statistical significant differences between treatments. The big difference in yield between sweet potato grown in humus soil and sweet potato treated conventionally probably is related to the fact that the structure of soil which is a clay loam soil was too compact for the cultivation of sweet potato, a disadvantage which has been compensated by using humus soil as substrate while substituting soil.

74. Elvanidi, A., Katsoulas, N., **Ferentinos, K.P.**, Bartzanas, T., Kittas, C. 2018. Hyperspectral machine vision as a tool for water stress severity assessment in soilless tomato crop. **Biosystems Engineering**, 165, 25-35. doi: 10.1016/j.biosystemseng.2017.11.002

Early detection of water deficit stress is essential for efficient crop management. In this study, hyperspectral machine vision was used as a non-contact technique for detecting changes in spectral reflectance of a soilless tomato crop grown under varying irrigation regimes. Four different irrigation treatments were imposed in tomato plants grown in slabs filled with perlite. The plants were grown in a growth chamber under controlled temperature and light conditions, and crop reflectance measurements were made using a hyperspectral camera to measure the radiation reflected by the crop from 400 nm to 1000 nm. The results showed that crop reflectance increased with increasing water deficit, and the detected reflectance increase was significant during the first day of irrigation was withheld. Based on the reflectance measurements, several crop indices were calculated and correlated with substrate volumetric water content and tomato leaf chlorophyll content. The results showed that when the modified red simple ratio tndex (mrSRI) and the modified red normalized vegetation index (mrNDVI) values increased by more than 2.5% and 23% respectively, the substrate volumetric water content decreased by more than 3%. In addition, when the Transformed Chlorophyll Absorption Reflectance Index (TCARI) value increased by about 16%, the leaf chlorophyll content decreased by about 3%. These results of the present study are promising for the development of a non-contact method for estimating plant water status in tomato crops grown under controlled environment.

75. Esmaeli, S., Moghaddam, AA., Barzegar, R., **Tziritis, E.** (2018). Multivariate statistics and hydrogeochemical modelling for source identification of major elements and heavy metals in the groundwater of Qareh-Ziaeddin plain, NW Iran. **Arabian Journal of Geosciences** 11:5, https://doi.org/10.1007/s12517-017-3317-1

The present study aims to evaluate the possible source of major and some minor elements and heavy metals in the groundwater of Qareh-Ziaeddin plain, NW Iran with respect to chemical elements, saturation index, and multivariate statistics including correlation coefficient, cluster analysis, and factor analysis. Groundwater samples were collected in Jun 2016 and measured with respect to EC, pH, major and some minor elements and heavy metals including Fe, Mn, Zn, Cr, Pb, Cd, Al, and As. Among all the measured parameters, some of the samples exceed the World Health

Organization (WHO) guideline value for EC, Na, Mg, HCO3, SO4, Cl, NO3, F, As, Zn, and Pb. The results of correlation analysis show that weathering and dissolution of minerals especially evaporites and silicates, water-rock interaction, and cation exchange are dominant occurred processes in the groundwater of the study area. Also, denitrification process is occurred in the groundwater system. Cluster analysis categorizes the samples into three distinct groups which are different based on their EC and dependent variables, e.g., Na, Ca, Cl, SO4 and pH, Pb, Cd, and As. It can be found that volcanic, evaporite, and clay formations have the least impact on the chemistry of the cluster 1 samples while clay and evaporite formations have the highest impact on the cluster 3 and also calcareous formations on cluster 2. Factor analysis shows that five factors, with total variance of 83%, are effective in the release of heavy metals and groundwater chemistry which are mostly geogenic**.**

76. Evangelides C. and **Arampatzis G.,** 2018. Data for moisture measurements during vertical absorption in building porous materials such as brick and limestone. **Data in Brief**, vol 17, 575-578.

This article contains the datasets obtained from experiments in laboratory related to moisture propagation in building porous materials. The datasets contain moisture measurements and corresponding time measurements during vertical infiltration experiment in brick and limestone samples. Moisture measurements were carried out using a γ-ray device and water volume absorption was recorded by a computer controlled digital scale.

77. Evangelides C., **Arampatzis G.,** Tsambali A-A., Tzanetaki E. and Tzimopoulos C., 2018. Moisture estimation in building materials with a simple procedure. **Construction and Building Materials,** vol 164, 830-836.

A lot of research is carried out in water flow through soils, where soils are treated as porous media. Since many building materials can be also considered as porous media the same theories and methods can be applied. The aim of this research is to provide an easy laboratory method to estimate vertical moisture profiles in building materials. The method is based on measurements of porosity, accurate measurements of the sample dimensions. During the experimental procedure, visual inspection of the profile length h(x) and measurements of inlet water as a function of time are monitored. From the previously obtained data, the transformed profile is generated by treating the whole process as an optimization problem. The method was applied to two different building materials namely limestone and brick and the results were verified through another experimental procedure using gamma ray (c-ray) absorption. The results show that this method can be used to estimate transformed profile and consequently h(x) and h(t) profiles. It is heavily based on visual observations of the profile length utilizing few and inexpensive equipment with quite accurate results. Accuracy was better than 2.5% regarding sorptivity calculated from c-ray produced k(h) profiles on one hand and by the proposed method on the other

78. **Ferentinos, K.P.** 2018. Deep learning models for plant disease detection and diagnosis. **Computers and Electronics in Agriculture**, 145, 311-318. doi: 10.1016/j.compag.2018.01.009

In this paper, convolutional neural network models were developed to perform plant disease detection and diagnosis using simple leaves images of healthy and diseased plants, through deep learning methodologies. Training of the models was performed with the use of an open database of 87,848 images, containing 25 different plants in a set of 58 distinct classes of [plant, disease] combinations, including healthy plants. Several model architectures were trained, with the best

performance reaching a 99.53% success rate in identifying the corresponding [plant, disease] combination (or healthy plant). The significantly high success rate makes the model a very useful advisory or early warning tool, and an approach that could be further expanded to support an integrated plant disease identification system to operate in real cultivation conditions.

79. Fijani, E., Barzegar, R., Deo, R., **Tziritis, E.**, Skordas, K. (2018) Design and implementation of a hybrid model based on two-layer decomposition method coupled with extreme learning machines to support real-time environmental monitoring of water quality parameters. **Science of the Total Environment** 648:839-853, https://doi.org/10.1016/j.scitotenv.2018.08.221

Accurate prediction of water quality parameters plays a crucial and decisive role in environmental monitoring, ecological systems sustainability, human health, aquaculture and improved agricultural practices. In this study a new hybrid two-layer decomposition model based on the complete ensemble empirical mode decomposition algorithm with adaptive noise (CEEMDAN) and the variational mode decomposition (VMD) algorithm coupled with extreme learning machines (ELM) and also least square support vector machine (LSSVM) was designed to support real-time environmental monitoring of water quality parameters, i.e. chlorophyll-a (Chl-a) and dissolved oxygen (DO) in a Lake reservoir. Daily measurements of Chl-a and DO for June 2012–May 2013 were employed where the partial autocorrelation function was applied to screen the relevant inputs for the model construction. The variables were then split into training, validation and testing subsets where the first stage of the model testing captured the superiority of the ELM over the LSSVM algorithm. To improve these standalone predictive models, a second stage implemented a two-layer decomposition with the model inputs decomposed in the form of high and low frequency oscillations, represented by the intrinsic mode function (IMF) through the CEEMDAN algorithm. The highest frequency component, IMF1 was further decomposed with the VMD algorithm to segregate key model input features, leading to a two-layer hybrid VMD-CEEMDAN model. The VMD-CEEMDAN-ELM model was able to reduce the root mean square and the mean absolute error by about 14.04% and 7.12% for the Chl-a estimation and about 5.33% and 4.30% for the DO estimation, respectively, compared with the standalone counterparts. Overall, the developed methodology demonstrates the robustness of the two-phase VMD-CEEMDAN-ELM model in identifying and analyzing critical water quality parameters with a limited set of model construction data over daily horizons, and thus, to actively support environmental monitoring tasks, especially in case of high-frequency, and relatively complex, real-time datasets.

80. Gautam, S.K., **Tziritis, E.**, Singh, S.K., Tripathi, J.K., Singh, A.K. (2018) Environmental monitoring of water resources with the use of PoS index: a case study from Subarnarekha River basin, India. **Environmental Earth Sciences** 77:70, https://doi.org/10.1007/s12665-018-7245-5

Ten surface and ten groundwater samples were collected from the middle part of Subarnarekha River basin, Jharkhand, India, during the pre-monsoon, monsoon and post-monsoon periods in the year 2008 (n = 60) in order to outline the hydrogeochemical signatures and to assess their overall quality. The study area was selected for their significance to diverse physiographic characteristics, mining and cultivation practices. Samples were analyzed for totally 21 parameters, including of physicochemical properties (pH, electrical conductivity and total dissolved solids), major and minor ions (Na^+, K^+, Ca^{2+}, Mg^{2+}, F^-, Cl^-, $SO4^{2-}$ and $NO3^-$) and trace elements (Cd, Co, Cr, Cu, Fe, Mn, Ni, Pb, Sr and Zn). Results suggest that quality status, in general, is acceptable with few exceptions;

however, issues related to the mining and imposed cultivation were identified which in turn could potentially lead to environmental degradation. The geogenic factors and anthropogenic influences are affecting the hydrogeochemical characteristics of water resources in the study area. The results were confirmed by numerical index Poseidon index (PoS) which has classified the samples according to their quality status. The PoS provides a generic water quality assessment through a single score that is representative of the overall hydrogeochemical characteristics of water, regardless of the processes involved, specific goals and characterization. Overall, the geological setup, hydrogeological regime, unmanaged cultivation practices and overexploitation of groundwater have adverse impacts on water resources of the region. Environmental protection and production optimization may be achieved through the implementation of custom actions and appropriate management measures in the region.

81. Gavioli, A., Mancini, M., Milardi, M., **Aschonitis, V.,** Racchetti, E., Viaroli, P., Castaldelli, G., 2018. Exotic species, rather than low flow, negatively affect native fish in the Oglio River, Northern Italy. **River Research and Applications**, 34 (8), 887-897. doi: 10.1002/rra.3324

Rivers worldwide are impacted by human activities such as habitat degradation, habitat fragmentation, waterway flow regulation, and introduction of exotic species, which are responsible for the reduction or the disappearance of native species in many parts of the world. The Oglio River, a tributary of the Po River in Northern Italy, is a good example of a river with a long history of human alteration and where exotic invasions are present. We used data on water parameters and fish communities along the watercourse to investigate whether low flow conditions, degraded water quality, abundant exotic species, and the presence of migration barriers could be a disadvantage for native species. We used ordination methods (redundancy analysis), variance partitioning analysis, and the threshold indicator taxa analysis to explore changes in community composition and ecofunctional traits along an altitude gradient. We found that exotic species affected native ones more than water quality and hydromorphological parameters. Native species were most abundant in the upper reach of the Oglio River, despite low flow and shallow depth. Moreover, rheophilic and clear water native fish decreased rapidly in the lower reach of the river, where exotic species increased. This distribution could be explained by the presence of barriers in the middle reach, which block exotic species migrating upstream from the highly invaded Po River, and by a lower suitability of the upper reach for some exotic species. Our results provide a general description of the fish fauna of a strongly regulated river and can contribute to develop more effective fish and water management practices.

82. Gavioli, A., Milardi, M., Lanzoni, M., Mantovani, S., **Aschonitis, V.,** Soana, E., Fano, E.A., Castaldelli, G., 2018.Managing the environment in a pinch: red swamp crayfish tells a cautionary tale of ecosystem based management in northeastern Italy. **Ecological Engineering**, 120, 546-553. doi: 10.1016/j.ecoleng.2018.07.013

Farmlands are globally widespread and their management should consider both human and environmental needs. In fact, these man-made ecosystems provide subsistence to the human population but are also habitats for plant and animal communities. The worldwide increase of exotic species has affected native communities, but also human activities or health. We used an exploited farmland in northern Italy, where many exotics are present, as a test case for identifying restoration measures based on an ecosystem approach. In particular, we focused on red swap crayfish for its ecosystem engineering capabilities, and examined the factors affecting its invasion success in order to attempt the definition of management strategies. We used multivariate and regression analysis to evaluate the relationships between the red swamp crayfish, water quality, macrophytes

abundance, watercourse hydraulics and the fish community. All analyses indicated that red swamp crayfish was less likely to establish in large, deeper and fast flowing waterways, especially when these are deprived of vegetation and less eutrophicated. Based on our results, fish predation was also a significant factor in limiting red swamp crayfish abundance. We thus concluded that a different hydraulic management, which leaves more water in irrigation canals throughout the winter, could be possibly used to slow down or even reverse the invasion process.

83. Gissi, E., Gaglio, M., **Aschonitis, V.G.,** Fano, E.A., Reho, M., 2018. Soil-related ecosystem services trade-off analysis for sustainable biodiesel production. **Biomass and Bioenergy**, 114, 83-99. doi: 10.1016/j.biombioe.2017.08.028

There have been strong calls globally to improve the sustainability of biodiesel production from oilseeds. Nevertheless, there is a lack of robust methodologies that are able to depict the local impacts of intensive feedstock production on soil properties and functions. The aim of this study is to quantify and map the potential biodiesel production from oilseed (e.g. soybean, sunflower and rapeseed), and understand possible trade-offs with other soil-related Ecosystem Services (ESs) such as i) habitat for soil organisms (supporting service), ii) soil carbon storage (regulating service), iii) groundwater quality protection (regulating service) and iv) food crops (provisioning service). This method is tested on current intensive agricultural areas of the Veneto region plain of Northern Italy. The results suggest that the study area has a sustainable biodiesel production potential of 20.7 dam^3 per year, which is only 52% of the regional target for the year 2020. The areas that are currently under other annual crops (primarily cereals and maize) can also have a significant further contribution that if exploited would greatly exceed the regional target. This finding indicates that achieving the regional target will be impossible without having significant trade-offs with other soil-related ES or causing land use change. The proposed methodology could provide a tool that could be integrated within (and potentially improve the effectiveness of) biofuel certification schemes, strategic environmental assessments of renewable energy pathways, and regional energy plans.

84. **Hatzigiannakis E., Arampatzis G., Dalambakis P., Karyoti A**., Tsitouras A., **Vrouchakis I., Panagopoulos A.**, Karyotis Th., (2018) A practical method for mapping of pesticide loss risk in cultivated soils of Greece, **Amer. Scient. Res. Journ. for engin. Tech. and Sciences,** 48:1, pp. 104-114

In an attempt to map the soil factors controlling pesticide losses, surface soil samples were collected from 196 sites in the cultivated area of Trifyllia, SW Peloponnese, Greece. Up to now, the pesticide losses risk in the studied area is unknown. For this aim, the following key characteristics that affect movement or binding have been taken into consideration: soil texture, slope and soil organic matter content. A GIS map was compiled from discrete soil variables that affect pesticide losses (leaching and/or runoff). According to soil texture, 3 moderate leaching risk classes, 2 high and 1 low were defined, and the respective classes based on Soil Organic Matter (SOM) content were 3 low risk classes, 2 moderate and 1 class of high risk. The study area consists of two soil slope classes 0-2% and 2-6% which were used to calculate the leaching potential of pesticides. The compiled maps can be used by local authorities in order to minimize the potential negative environmental impacts of pesticide usage at farm level, and to suggest various mitigation strategies. Appropriate farming practices must be applied to decrease leaching or losses by runoff in order to mitigate the pollution of shallow aquifers and surface waters in SW Peloponnese. Rational irrigation management is of high importance as it increases the pesticide effectiveness and reduces off site movement. Moreover, runoff of pesticides can be reduced by using minimum tillage techniques to mitigate soil erosion. Finally, farming systems and practices that increase soil organic matter content (e.g. no

tillage) can reduce substantially the risk of water pollution by pesticides.

85. Ioannou C. S., G. A. Kyritsis, **V. Mavraganis**, N. A. Kouloussis, N. T. Papadopoulos. Arthropod biodiversity in citrus orchards following the application of a mass trapping strategy against *Ceratitis capitata* using the novel attractant BioDelear Integrated Control in Citrus **Fruit Crops IOBC-WPRS Bulletin** Vol. 132, 2018 p. 164.

86. Kalpakis, V., Kokkos, N., **Pisinaras, V.**, & Sylaios, G. (2018). An integrated coastal zone observatory at municipal level: the case of Kavala Municipality, NE Greece. **Journal of Coastal Conservation,** 1-14.
The Integrated Coastal Zone Management (ICZM) Observatory of Kavala Municipality has been developed during the Mare Nostrum Project following the well-known DPSIR concept (Drivers, Pressures, States, Impacts and Responses). The Observatory aims to aid the day-to-day operations of the Municipality, collecting, analyzing and processing historic, present and forecasted environmental, socio-economic and legal-institutional ICZM datasets collected from a variety of sources. Data are presented in a series of well-structured layers imported in a Geographic Information System (GIS) web-environment, to aid decision-makers at Municipal, Regional and National level to formulate policies on ICZM matters; to provide reliable datasets to scientists and engineers; to engage active citizens and the broader public into coastal zone issues; to promote the distribution of information among coastal managers, stakeholders and the general public. Static datasets as topographic, bathymetric, geologic and other base maps, urban and rural planning maps, local municipal acts, public networks and locations of public interest were digitized and embedded in the system. Historic environmental data together with dynamic data produced daily by a series of coupled operational models (meteorological, hydrologic, hydrodynamic, wave and eutrophication) and climate change datasets were also included. The legal-institutional framework of the coastline and the interactive tools to enhance public participation represent novel elements of the herein presented ICZM Observatory. The Kavala Gulf mussel farmers, the local Port Authority and the decision-makers on siting hydroplane landing-zones are the main user groups of the ICZM Observatory.

87. Karagiannis, E., Michailidis, M., **Tanou, G.**, Samiotaki, M., Karamanoli, K., Avramidou, E., ... Molassiotis, A., 2018. Ethylene –dependent and –independent superficial scald resistance mechanisms in ‘Granny smith’ apple fruit. **Scientific Reports**, 8(1), Art.no.: 11436. doi: 10.1038/s41598-018-29706-x
Superficial scald is a major physiological disorder of apple fruit (Malus domestica Borkh.) characterized by skin browning following cold storage; however, knowledge regarding the downstream processes that modulate scald phenomenon is unclear. To gain insight into the mechanisms underlying scald resistance, ‘Granny Smith’ apples after harvest were treated with diphenylamine (DPA) or 1-methylcyclopropene (1-MCP), then cold stored (0 °C for 3 months) and subsequently were ripened at room temperature (20 °C for 8 days). Phenotypic and physiological data indicated that both chemical treatments induced scald resistance while 1-MCP inhibited the ethylene-dependent ripening. A combination of multi-omic analysis in apple skin tissue enabled characterization of potential genes, proteins and metabolites that were regulated by DPA and 1-MCP at pro-symptomatic and scald-symptomatic period. Specifically, we characterized strata of scald resistance responses, among which we focus on selected pathways including dehydroabietic acid biosynthesis and UDP-D-glucose regulation. Through this approach, we revealed scald-

associated transcriptional, proteomic and metabolic signatures and identified pathways modulated by the common or distinct functions of DPA and 1-MCP. Also, evidence is presented supporting that cytosine methylation-based epigenetic regulation is involved in scald resistance. Results allow a greater comprehension of the ethylene–dependent and –independent metabolic events controlling scald resistance.

88. Karyotis K., Gulbahar N, **Panagopoulos A.** (2018) A two-dimensional nitrogen fertilization model for irrigated crops in Turkey, **Amer. Scient. Res. Journ. For engin. Tech. and Sciences**, 41:1, pp. 319-332.

The main aim of this scientific work was to develop a theoretical model for calculation of nitrogen (N) fertilization of crops. The model is based on the N fertilization plans which had been prepared for the requirements of the Technical Assistance Project entitled “Implementation of Nitrates Directive in Turkey”. It was compiled and tested in irrigated corn crop. This has the possibility to calculate the amount of nitrogen which is required in a wide range of mean annual rainfall. It was tested for areas which receive mean annual rainfall 500-1500 mm and nitrates content in irrigation waters was 10 mg/L. Crop requirements in water are not covered by rainfall in the growing period of crops, due to uneven annual distribution during growing period and additional water is needed by mean of irrigation. Soil texture affects strongly the required quantity of soil nutrients and irrigation water and for this reason, the following textural soil classes were used: light, moderate, heavy texture and soils with organic matter 6% and clay 30%.This model is the basis for the development of auser friendly graphic environment which was built in Python 3.5. This tool can calculate the required Nitrogen for all possible triplets(soil class, annual rainfall, nitrogen from irrigation water) required for every annual crop. The user has simply to choose the crop type, the soil class, then to type the annual rainfall and the N content of irrigation water. The model uses as inputs three variables, namely the qualitative soil class and two quantitative annual rainfall (in mm/y) and nitrates inputs from irrigation (content in mg/L) and returns as an output the required Nitrogen in kg/da (1 da=1000 m^2) for the described instance. Results have indicated that the requirements of nitrogen fertilization for corn varied among soil classes although irrigation water had the same nitrates concentration. This can be attributed mainly to different potential of nitrates leaching and N mineralization.

89. **Kavvadias V.,** M. Papadopoulou**, E. Vavoulidou, S. Theocharopoulos**, S. Repas, G. Koubouris, G. Psarras, G. Kokkinos, 2018. Effect of addition of organic materials and irrigation practices on soil quality in olive groves. **Journal of Water and Climate Change 1** December 2018; 9 (4): 775–785.

The effect of addition of organic materials (shredded pruning residues, composted olive mill by-products) on spatial distribution of soil chemical and microbial properties in irrigated and rainfed olive groves was investigated. Most of the soil parcels were subjected to reduced tillage or no tillage practices. Soil sampling took place in 40 olive groves in the region of Messinia, south-western Peloponnese, Greece during a 5-year period (2012–2017). The results showed significant increases in soil organic matter, humic acids and nitrate content at the end of the study period, compared to the first year of the soil sampling campaign. On the other hand, the relatively low amount of fresh organic materials that was applied to the soil produced unfavorable results. Differences between irrigated and rainfed soil parcels were not significant, for most of the soil properties, since the area receives much higher loads of rain than the average rainfall, as registered in the main olive growing regions of Greece. The area underneath the tree canopy favors an environment that enhances soil

fertility, compared to the area out of the tree canopy. Changes of soil properties according to depth showed that the surface soil in olive orchards has the potential to sequester carbon and nutrients.

90. **Kavvadias V.,** M. Papadopoulou, **E. Vavoulidou, S. Theocharopoulos**, G. Koubouris, G. Psarras, Chr. Manolaraki, G. Giakoumaki, A. Vasiliadis, 2018. Effect of sustainable management of olive tree residues on soil fertility in irrigated and rain-fed olive orchards. **Journal of Water and Climate Change 1** December 2018; 9 (4): 764–774. doi: https://doi.org/10.2166/wcc.2018.143
Olive trees are a major source of agricultural residues. Strategies based on different management of organic amendments have been reported to increase soil fertility. The effect of sustainable organic matter input practices (application of shredded pruning residue and olive residue compost to soil) on soil properties in irrigated and rain-fed olive groves was investigated. The study took place in 40 olive groves in the region of Peza, island of Crete, Greece during a 5-year period (2012–2017). The results showed that olive trees play an important role in soil nutrient conservation under semi-arid conditions in the Mediterranean basin. The addition of olive tree residues, in combination with conservation tillage practices, improved soil fertility over the experimental period. Most of the soil properties were favored by irrigation. In olive soil parcels receiving organic materials the soil organic matter and the total nitrogen were increased in irrigated fields. The ability of surface soil to sequester carbon and nutrients beneath the tree canopy of olive groves was high. It is recommended that sustainable soil management practices should consider soil fertility variability of olive orchards.

91. Kouloussis N., Nikos Papadopoulos, Petros Damos, Charalambos Ioannou, Gerofotis Christos, Dimitrios Koveos, **V. Mavraganis,** 2018**.** Trapping efficacy of BioDelear-baited McPhail trapsagainst *Ceratitis capitata.* **Integrated Control in Citrus Fruit Crops IOBC-WPRS Bulletin** Vol. 132, 2018 p. 163

92. Koutsos T.M., **Chatzistathis, T.,** Balampekou, E.I., 2018. A new framework proposal, towards a common EU agricultural policy, with the best sustainable practices for the re-use of olive mill wastewater. **Science of the Total Environment** 622-623: 942-953.
The disposal of olive mill wastewater (OMW) is a serious environmental issue for the Mediterranean countries. However, there is still no common European legislation on the management and the re-use of OMW in agriculture, in the frame of sustainable crop management and the standards for the safe OMW disposal and re-use are left to be set by each EU country, individually. This review paper presents the most effective and sustainable practices for OMW, (treatment, application and management), which can maximize the benefits of OMW on crops and soils, while minimizing the potential hazards for public health, thus promoting environmental sustainability. The findings of this synthetic work suggest that there is enough information and proven sustainable practices to go ahead with the initial formulation of a new consensual framework, environmentally acceptable, socially bearable and economically viable, that could hopefully help to set the standards for the re-use of olive mil wastewater and can lead to a common EU policy on the management and re-use of OMW.

93. Lanzoni, M., **Aschonitis, V.,** Milardi, M., Fano, E.A., Castaldelli, G., 2018. A method to identify bimodal weight–length relations: Possible ontogenetic diet and/or metabolism shift

effects in Anguilla Anguilla (actinopterygii: Anguilliformes: Anguillidae). **Acta Ichthyologica et Piscatoria**, 48 (2), 163-171. doi: 10.3750/AIEP/02400

The power function $W = a \cdot L^b$ is commonly used to describe the weight–length (W–L) relation (WLR) of fish. Smaller/younger specimens may present different WLR from larger/older ones, introducing errors in the derivation of WLR of the total population. This difference appears through a breakpoint in the log–log plot of W–L data and can be justified due to biological factors or due to errors in the sampling procedure. The aim of the study is to propose a bilinear model (LinBiExp) that identifies the specific coordinates of the breakpoint in the log-transformed W–L measurements. Materials and methods. The analysis was performed using 2627 W–L measurements of European eel, Anguilla anguilla (Linnaeus, 1758), from the Comacchio Lagoon (Italy). The bilinearity produced by LinBiExp model was verified through comparison of slopes and intercepts (ANOVA) of the two linear segments and through the 95% intervals of the highest posterior density (HPD) distribution of breakpoint coordinates estimated by bootstrap regression of LinBiExp. Additionally, gut content analysis was performed in order to detect any diet shift in order to justify the existence of the breakpoint. Results. The LinBiExp function identified the breakpoint coordinates (L_t, W_t) = (28.9 cm, 35.9 g). The ANOVA showed that there was a statistically significant difference between the slopes and between the intercepts of the two linear segments at 99.9% confidence level. The 95% HPD intervals of L_t and W_t were 28.4–29.4 cm and 34.5–38.0 g, respectively, based on 10 000 bootstrap estimates. The gut content analysis showed inclusion of other fish preys in the diet of eels when their weight and length exceeded the coordinates of the breakpoint in W–L data. Conclusion. The estimated breakpoint for the specific dataset was justified by the possible interrelation of ontogenetic diet shift with other metabolic processes (e.g., beginning of sexual maturation). The study showed that the LinBiExp function can be a valuable tool for detecting the absolute coordinates of a breakpoint in log-transformed W–L data, while the presented methodology can increase the robustness of weight–length analysis of fishes using the typical power function.

94. Lanzoni, M., Milardi, M., **Aschonitis, V.,** Fano, E.A., Castaldelli, G., 2018. A regional fish inventory of inland waters in Northern Italy reveals the presence of fully exotic fish communities. **European Zoological Journal**, 85 (1), 1-7. doi: 10.1080/24750263.2017.1415384

The aim of the study is to present a complete and updated fish inventory of inland waters of the Emilia-Romagna region, Northern Italy, and to highlight the presence of fully exotic fish communities. Overall, based on 208 sampling locations, the observed fish fauna consisted of 45 species, 22 native and 23 exotics. A significant element of the inventory is the identification of xenodiversity hotspots (spatially clustered sites, one lowland and one upland region), where a complete substitution of native species by exotic species was observed (in total seven sites in the lowland and two sites in the upland with no native species presence). These xenodiversity hotspots were found to host specific combinations of exotic species, which may be able to constitute balanced exotic communities. The hotspots of the lowland region are located in the northeast lowland part of the territory, hosting exotic species combinations mainly composed by wels catfish (Silurus glanis Linnaeus, 1758, a large predator), common carp (Cyprinus carpio Linnaeus, 1758, a large benthivore), crucian carp (Carassius spp., a small-bodied generalist) and other less dominant exotic species. The hotspots in the upland region were located in the southwest part of the territory and were dominated by only one exotic species (rainbow trout, Oncorhynchus mykiss (Walbaum, 1792)). A difference between these xenodiversity hotspots is that in the lowland the introductions were mostly unintentional and are not continued, while in the upland the introduction of rainbow trout is intentional and currently carried out by local fishermen.

95. Li, L., Li, J., Wang, H., Georgieva, T., **Ferentinos, K.P.**, Arvanitis, K.G., Sigrimis, N.A., 2018. Sustainable energy management of solar greenhouses using open weather data on MACQU platform. **International Journal of Agricultural & Biological Engineering**, 11(1), 74-82. doi: 10.25165/j.ijabe.20181101.2713

Precision energy management is very important for sustainability development of solar greenhouses, since huge energy demand for agricultural production both in quantity and quality. A proactive energy management, according to the optimal energy utilization in a look-ahead period with weather prediction, is presented and tested in this research. A multi-input-multi-output linear model of the energy balance of solar greenhouses based on on-line identification system can simulate greenhouse behavior and allow for predictive control. The good time allocation of available solar energy can be achieved by intelligent use of controls, such as store/retrieve fans and ventilation windows, i.e. solar energy to warm up the air or to be stored in the storage elements (wall, soil, etc.) or to be exhausted to outside. The proactive energy management can select an optimal trajectory of air temperature for the forecasted weather period to minimize plants' thermal 'cost' defined by an 'expert' in terms of set-points for the specific crop. The selection of temperature trajectory is formulated as a generalized traveling salesman problem (GTSP) with precedence constraints and is solved by a genetic algorithm (GA) in this research. The simulation study showed good potential for energy saving and timely allocation to prevent excessive crop stress. The active control elements in addition to predefining and applying, within energy constraints, optimal climate in the greenhouse, it also reduces the energy deficit, i.e. the working hours of the 'heater' in the sustained freezing weather, as well as the ventilation hours, that is, more energy harvest in the warm days. This intelligent solar greenhouse management system is being migrated to the web for serving a 'customer base' in the Internet Plus era. The capacity, of the concrete ground CAUA system (CAUA is an abbreviations from both China Agricultural University and Agricultural University of Athens), to implement web 'updates' of criteria, open weather data and models, on which control actions are based, is what makes use of Cloud Data for closing the loop of an effective Internet of Things (IoT) system, based on MACQU (MAnagement and Control for QUality) technological platform.

96. Michailidis, M., Karagiannis, E., **Tanou, G.**, Sarrou, E., Adamakis, I., Karamanoli, K., … Molassiotis, A., 2018. Metabolic mechanisms underpinning vegetative bud dormancy release and shoot development in sweet cherry. **Environmental and Experimental Botany**, 155, 1-11. doi:10.1016/j. envexpbot.2018.06.024

Few studies have focused on the metabolic characterization of bud dormancy and shoot growth in temperate fruit species, although this is an intresting framework to anticipate adaptation in global climate changes. To examine this issue, two experimental approaches were applied, using sweet cherry (Prunus avium L. cv 'Grace Star') bud and shoot tissues. Initially, annual shoots containing vegetative buds that collected at endodormancy and ecodormancy stages were used to compare changes in shoots- and buds-specific metabolic profiles under chamber-controlled conditions. Detailed analysis suggested that primary metabolites, such as arabitol, fucitol and tryptophan were modified in buds from endo- to eco-dormancy. Differences between buds and shoots metabolic fingerprints were also found in various secondary metabolites, including quercetin, glucosides and osmotic-associated metabolites. In order to investigate the mechanism underlying shoot developmental during bud dormancy break, metabolic analysis was also conducted in annual shoots, that were sampled at five distinct bud-related vegetative stages from ecodormancy to fully developed leaf stage under natural orchard conditions. Several amino acids (ornithine, alanine, isoleucine, GABA, asparagine and tryptophan) and classes of secondary metabolites, including anthocyanidins (peonidin-3-O-galactoside), flavonoids (apigenin, isorhamnetin, chrysin and

trilobatin) and lignin-related compounds (sinapyl and coniferyl alcohols) were altered across developmental stages. Additionally, nutrient homeostasis was altered during shoot development, as N, P, Ca, Mg, B steady-state level as well as Ca/Mg + K and N/P stoichiometry were significantly changed. This study provides a bud- and shoot-based metabolic framework at different conditions and dormancy stages, thereby helps to understand dormancy release and bud-break in temperate fruit trees.

97. Milardi, M., **Aschonitis, V**., Gavioli, A., Lanzoni, M., Fano, E.A., Castaldelli, G., 2018. Run to the hills: exotic fish invasions and water quality degradation drive native fish to higher altitudes. **Science of the Total Environment**, 624, 1325-1335. doi: 10.1016/j.scitotenv.2017.12.237

While the significance of anthropogenic pressures in shaping species distributions and abundances is undeniable, some ambiguity still remains on their relative magnitude and interplay with natural environmental factors. In our study, we examined 91 late-invasion-stage river locations in Northern Italy using ordination methods and variance partitioning (partial-CCA), as well as an assessment of environmental thresholds (TITAN), to attempt to disentangle the effects of eutrophication and exotic species on native species. We found that exotic species, jointly with water quality (primarily eutrophication) and geomorphology, are the main drivers of the distribution of native species and that native species suffer more joint effects than exotic species. We also found that water temperature clearly separates species distributions and that some native species, like Italian bleak (Alburnus alborella) and Italian rudd (Scardinius hesperidicus), seem to be the most resilient to exotic fish species. We also analyzed the dataset for nestedness (BINMATNEST) to identify priority targets of conservation. As a result, we confirmed that altitude correlated negatively with eutrophication and nestedness of exotic species and positively with native species. Overall, our analysis was able to detect the effects of species invasions even at a late invasion stage, although reciprocal effects seemed comparable at this stage. Exotic species have pushed most native species on the edge of local extinction in several sites and displaced most of them on the rim of their natural distribution. Any potential site- and species-specific conservation action aimed at improving this situation could benefit from a carefully considered prioritization to yield the highest results-per-effort and success rate. However, we encourage future research to update the information available before singling out specific sites for conservation or outlining conservation actions.

98. Minas, I. S., **Tanou, G.**, Krokida, A., Karagiannis, E., Belghazi, M., Vasilakakis, M., … Molassiotis, A. 2018. Ozone-induced inhibition of kiwifruit ripening is amplified by 1-methylcyclopropene and reversed by exogenous ethylene. **BMC Plant Biology**, 18(1) doi:10.1186/s12870-018-1584-y

Background: Understanding the mechanisms involved in climacteric fruit ripening is key to improve fruit harvest quality and postharvest performance. Kiwifruit (Actinidia deliciosa cv. 'Hayward') ripening involves a series of metabolic changes regulated by ethylene. Although 1-methylcyclopropene (1-MCP, inhibitor of ethylene action) or ozone (O3) exposure suppresses ethylene-related kiwifruit ripening, how these molecules interact during ripening is unknown. Results: Harvested 'Hayward' kiwifruits were treated with 1-MCP and exposed to ethylene-free cold storage (0 °C, RH 95%) with ambient atmosphere (control) or atmosphere enriched with O3 (0.3 μL L- 1) for up to 6 months. Their subsequent ripening performance at 20 °C (90% RH) was characterized. Treatment with either 1-MCP or O3 inhibited endogenous ethylene biosynthesis and delayed fruit ripening at 20 °C. 1-MCP and O3 in combination severely inhibited kiwifruit ripening,

significantly extending fruit storage potential. To characterize ethylene sensitivity of kiwifruit following 1-MCP and O3 treatments, fruit were exposed to exogenous ethylene (100 µL L- 1, 24 h) upon transfer to 20 °C following 4 and 6 months of cold storage. Exogenous ethylene treatment restored ethylene biosynthesis in fruit previously exposed in an O3-enriched atmosphere. Comparative proteomics analysis showed separate kiwifruit ripening responses, unraveled common 1-MCP- and O3-dependent metabolic pathways and identified specific proteins associated with these different ripening behaviors. Protein components that were differentially expressed following exogenous ethylene exposure after 1-MCP or O3 treatment were identified and their protein-protein interaction networks were determined. The expression of several kiwifruit ripening related genes, such as 1-aminocyclopropane-1-carboxylic acid oxidase (ACO1), ethylene receptor (ETR1), lipoxygenase (LOX1), geranylgeranyl diphosphate synthase (GGP1), and expansin (EXP2), was strongly affected by O3, 1-MCP, their combination, and exogenously applied ethylene. Conclusions: Our findings suggest that the combination of 1-MCP and O3 functions as a robust repressive modulator of kiwifruit ripening and provide new insight into the metabolic events underlying ethylene-induced and ethylene-independent ripening outcomes.

99. Minas, I. S., **Tanou, G.**, Molassiotis, A., 2018. Environmental and orchard bases of peach fruit quality. **Scientia Horticulturae**, 235, 307-322. doi: 10.1016/j.scienta.2018.01.028

This article provides an overview of preharvest factors that affect peach fruit quality attributes. Improvement of peach fruit quality is impossible postharvest. Hence, optimum peach quality at harvest and during postharvest and subsequently, consumer satisfaction, is achievable through understanding the influence of preharvest environmental and orchard factors. 'Quality' definition for producers, packers, shippers and consumers is discussed, with a description of the most important peach quality attributes and the physiological mechanisms that affect them. The effect of cultivar, rootstock, harvest time, crop load management, light manipulation, fruit position in the canopy, irrigation, fertilization and the impact of the growing environment on peach and nectarine harvest quality are reviewed. The development of new technologies that help clarify the biological and horticultural bases of preharvest factors on peach fruit quality can help increase peach consumption.

100. **Monokrousos N**, Papatheodorou EM, Stamou GP (2018). Dimension and structural traits of soil macropores in cultivations differing in the duration of organic management. **Environmental Engineering and Management Journal** 17, 1555-1562.

The objectives of this study were to investigate: a) whether the duration of organic farming influences the dimension, shape and geometry (fractal dimension) of soil micropores (<50µm) and b) for relationships of morphometric traits with certain chemical and biochemical soil variables (microbial biomass, N- and C-mineralization rates, NH4+, NO3-, organic C and N, extractable P, Mg+2, K+, Ca+2). We compared soil micromorphometric traits (area, perimeter, compactness, solidity, eccentricity) among fields with different duration of organic farming (2 (O2), 3 (O3), 5 (O5), and 6 years (O6)): these were planted with *Asparagus officinalis* and one was conventional cultivation (CV). No significant differences were observed among the morphometric traits of all fields. However, the soil of the older organic areas (O6, O5 and O3) was characterized by small-sized pores (<10 µm) while the newest (O1) and the conventional field were characterized by medium-sized micropores (10-20 µm). The fractal dimension D2 of the larger pores was found to be significantly

higher in O2 and O3 fields, indicating larger outline irregularity for these particular pores. Higher fractal dimension could be related to more heterogeneous distribution of the microbial community in space. All micropores were correlated with the concentration of soil mineral nutrients (Mg+2, K+, Ca+2). In the small pore size category (≤10 μm), N-microbial and NO3- concentrations, parameters involved in the nitrogen cycle, were found to be correlated to the structure characteristics. Taking into account that the three older organic fields are characterized mainly by small sized pores (≤10 μm), it is suggested that improved soil quality is mainly related with the N-cycle.

101. Moustaka, J., Panteris, E., Adamakis, I.S., **Tanou, G.,** Giannakoula, A., Eleftheriou, E. P., Moustakas, M., 2018. High anthocyanin accumulation in poinsettia leaves is accompanied by thylakoid membrane unstacking, acting as a photoprotective mechanism, to prevent ROS formation. **Environmental and Experimental Botany**, 154, 44-55. doi: 10.1016/j.envexpbot.2018.01.006

In poinsettia (Euphorbia pulcherrima Willd. ex Klotzsch.), green leaves turn reddish and then red, due to vacuolar anthocyanin accumulation. Reddish leaves accumulate anthocyanins mainly in the adaxial (upper) epidermis, and less in the mesophyll cells, while red, in both adaxial and abaxial (lower) epidermides, and the adjacent mesophyll cells. In green leaves, the photoprotective mechanism of non-photochemical quenching (NPQ) is sufficient under low light (LL), but not under high light (HL), which results in a more reduced redox state of the plastoquinone (PQ) pool compared to reddish. In red leaves, higher anthocyanin accumulation is accompanied by unstacking of thylakoid membranes that results in loss of photosystem II (PSII) complexes and undetectable hydrogen peroxide (H2O2). Superoxide dismutase (SOD) activity is enhanced in the reddish compared to green leaves, while it decreases significantly in the red ones. Anthocyanin accumulation was significantly correlated to the redox state of the PQ pool and the higher accumulation in reddish compared to green leaves was responsible for the diminished H2O2 production, since ascorbate peroxidase (APX) activity remained unchanged in all leaves. We suggest that H2O2 production regulated by the redox state of the PQ pool induces anthocyanin biosynthesis that is accompanied by thylakoid membrane unstacking and loss of PSII complexes, serving as a photoprotective mechanism to HL, preventing the formation of reactive oxygen species (ROS).

102. Ntalli N, **Monokrousos N**, Rumbos C, Kontea D, Zioga D, Argyropoulou MD, Menkissoglu-Spiroudi U, Tsiropoulos NG (2018). Greenhouse biofumigantion with *Melia azedarach* controls *Meloidogyne* sp. and enhances soil biological activity. **Journal of Pest Science** 91, 29-40.

The need for environmentally friendly agricultural practices has led to the development of plant-based nematicides for root-knot nematode control. The efficacy of these botanicals has been tested primarily under laboratory and rarely under actual field conditions. Moreover, any side effects on non-target soil organisms that support soil biological activity are usually ignored. Herein, we evaluate the efficacy of *Melia azedarach* preparations against *Meloidogyne* spp. in a tomato greenhouse, by root gall examination and soil J2 enumeration. We also assessed side effects on soil microbes through PLFA analysis and microbivorous nematodes, and we quantified several plant growth parameters (e.g., fruit number and weight, root weight). Different treatments within the greenhouse included *M. azedarach* ripe fruit powder (MFP), ripe fruit water extract (MWE) and furfural, one of the principal active ingredients of *M. azedarach* and previously known to exhibit fumigant nematicidal activity. Results were compared to those obtained with the commercial nematicides

oxamyl (Vydate_ 10 SL) and an untreated control. All treatments were repeated every 20 days throughout the cultivation period. MFP and MWE suppressed *Meloidogyne* spp. often at the same levels obtained by furfural and oxamyl treatments and enhanced soil biological activity, as indicated by the proliferation of soil microbes and microbial feeding nematodes. Furfural and oxamyl adversely affected the soil community, especially the free-living nematodes. Moreover, furfural was phytotoxic to tomato plants in spite of its natural origin.

103. Papadopoulos N. T., C. S. Ioannou, G. A. Kyritsis, **V. Mavraganis**, N. A. Kouloussis, E. Bebelou. BioDelear: a new attractant for an environmentally sound management of *Ceratitis capitata* employing a mass trapping strategy. **Integrated Control in Citrus Fruit Crops IOBC-WPRS Bulletin** Vol. 132, 2018 p. 162.

BioDelear is a new, nontoxic, attractant for the Mediterranean fruit fly (medfly), Ceratitis capitata that is currently, in the frameworks of the Life-BioDelear project, used to control the populations of this noxious pest in citrus farms in Chios, Greece. During the first phase of the project (2015 and 2016), the efficacy of mass trapping using BioDelear-baited McPhail-type traps was contrasted against mass trapping using, BioLure-baited McPhail traps, conventional management (cover insecticide sprays when needed) and control (non-managed) plots. Mass-trapping with the environmentally friendly attractant BioDelear provides protection against medfly infestation similar to that of mass trapping using the attractant BioLure and conventional pest management. First estimates suggest that mass trapping with BioDelear is a rather inexpensive, environmental sound pest management alternative against the Mediterranean fruit fly.

104. Papadopoulou, E.S., Perruchon, C., Vasileiadis, S., Rousidou, C., **Tanou, G.**, Samiotaki, M., … Karpouzas, D.G., 2018. Metabolic and evolutionary insights in the transformation of diphenylamine by a pseudomonas putida strain unravelled by genomic, proteomic, and transcription analysis. **Frontiers in Microbiology**, 9, Art.no: 676. doi:10.3389/fmicb.2018.00676

Diphenylamine (DPA) is a common soil and water contaminant. A Pseudomonas putida strain, recently isolated from a wastewater disposal site, was efficient in degrading DPA. Thorough knowledge of the metabolic capacity, genetic stability and physiology of bacteria during biodegradation of pollutants is essential for their future industrial exploitation. We employed genomic, proteomic, transcription analyses and plasmid curing to (i) identify the genetic network of P. putida driving the microbial transformation of DPA and explore its evolution and origin and (ii) investigate the physiological response of bacterial cells during degradation of DPA. Genomic analysis identified (i) two operons encoding a biphenyl (bph) and an aniline (tdn) dioxygenase, both flanked by transposases and (ii) two operons and several scattered genes encoding the ortho-cleavage of catechol. Proteomics identified 11 putative catabolic proteins, all but BphA1 up-regulated in DPA- and aniline-growing cells and showed that the bacterium mobilized cellular mechanisms to cope with oxidative stress, probably induced by DPA and its derivatives. Transcription analysis verified the role of the selected genes/operons in the metabolic pathway: DPA was initially transformed to aniline and catechol by a biphenyl dioxygenase (DPA-dioxygenase); aniline was then transformed to catechol which was further metabolized via the ortho-cleavage pathway. Plasmid curing of P. putida resulted in loss of the DPA and aniline dioxygenase genes and the corresponding degradation capacities. Overall our findings provide novel insights into the evolution of the DPA degradation pathway and suggests that the degradation capacity of P. putida was acquired through recruitment of the bph and tdn operons via horizontal gene transfer.

105. Papaioannou, E., **Chatzistathis, T.,** Menexes, G., 2018. The impact of management practices on soil fertility and foliar nutrient concentrations in a spruce forest ecosystem of Rodopi mountainous area, in Northern Greece. **Notulae Botanicae Horti Agrobotanici Cluj-Napoca** 46: 301-308.

After forest harvesting, organic matter accumulation and soil nutrient availability are usually negatively influenced, especially during the first years. The hypothesis that 15 years after selective harvesting (15Y) the increased forest biomass, together with the enhanced nutrient recycling rates, compared to 5-years after harvesting (5Y), could restore nutrient availability and organic C accumulation (both in forest floor and soil) to similar levels to the intact site, was tested. The aim of this study was to investigate the effect of the timing of management practices (intact forest-control, 5Y, 15Y) on organic matter content, nutrient concentrations in needles, forest floor and soil, in a forest ecosystem of Picea abies L., in Rodopi mountainous area, in northern Greece. Significant differences between the intact site and the other two treatments were found in: i) soil N, P, C/N and exchangeable Ca, ii) organic matter and nutrient accumulation (basically in the upper 30 cm), iii) foliar K, Fe and Zn concentrations. In conclusion: i) forest management practices clearly influenced soil fertility and organic matter accumulation, ii) 15 years after selective harvesting nutrient and organic C accumulation in forest floor, as well as K and Fe accumulation in soil were restored to similar levels to the intact sites; thus, our hypothesis was partially correct.

106. Petropoulos, G.P., Srivastava, P.K., **Ferentinos, K.P.**, Hristopoulos, D. 2018. Evaluating the capabilities of optical/TIR imaging sensing systems for quantifying soil water content. **Geocarto International**, doi: 10.1080 /10106049.2018.1520926.

Surface Soil Moisture (SSM) is a key parameter of global energy and water cycle, and knowing its spatiotemporal variability is of key importance in an array of research topics and practical applications alike. Recent developments in Earth Observation (EO) have indicated that SSM can be retrieved from different regions of electromagnetic spectrum, and numerous approaches have been proposed to facilitate this. Herein, are reviewed the SSM retrieval techniques exploiting optical and thermal EO data, including synergistic techniques with other types of EO datasets. The challenges and limitations of EO in this respect are discussed, aiming at providing a roadmap on which future research should be directed. It is also apparent that to satisfy the requirements for SSM information for practical applications, effort should be towards the investigation of the synergistic use of EO systems in deriving SSM for water resources applications.

107. **Pisinaras, V., Panagopoulos, A.**, Herrmann, F., Bogena, H. R., **Doulgeris, C., Ilias, A., Tziritis, E.**, & Wendland, F. (2018). Hydrologic and Geochemical Research at Pinios Hydrologic Observatory: Initial Results. **Vadose Zone Journal**, 17(1).

The Pinios Hydrologic Observatory (PHO) is located in the River Pinios basin, which is one of the most productive basins in Greece. The PHO was established to develop deep knowledge of water balance at the river basin scale and to improve understanding of the major hydrodynamic mechanisms to improve hydrological modeling and ultimately sustainable water resource management. The PHO comprises three meteorological stations, 12 groundwater monitoring sites, and one soil moisture monitoring site, which includes frequency domain reflectometry sensors

(SoilNet) and a cosmic-ray neutron sensor (CRNS) probe. Although the PHO was recently established (at the end of 2015), the preliminary findings from data analysis are promising. Calculated reference evapotranspiration (ETo) gradients demonstrate differences regarding their annual cycle, total amount, and altitude level. Moreover, climate analysis indicates nocturnal mountain-valley winds. Groundwater level spatial distribution indicates the dominant recharge mechanisms to the alluvial aquifer system. These findings are also supported by the hydrochemical data analysis (electrical conductivity and, secondarily, NO3 distribution). Locally elevated NO3 concentrations are attributed to agricultural activities and call for review of the adopted farming practices. Results from the soil moisture monitoring site indicate a very good match between the CRNS probe and the average SoilNet data. Future perspectives of the PHO include geophysical surveys to accurately delineate the geometry of the groundwater system, the expansion of groundwater and soil moisture observation networks, and the application of the mGROWA hydrologic model to accurately simulate the hydrological processes in the PHO and upscale in the entire River Pinios basin. Finally, in support of the local farmers, we plan to develop and implement a distributed irrigation programming protocol in the entire area of the PHO.

108. Rahmati M., Weihermüller L., Vanderborght J., Pachepsky Y. A., Mao L., Sadeghi S. H., Moosavi N., Kheirfam H., Montzka C., … , **Arampatzis G., Hatzigiannakis E., Panagopoulos A.,** … and Vereecken H., 2018. Development and analysis of the soil water infiltration global database. **Earth System Science Data,** vol. 10(3), 1237-1263.

In this paper, we present and analyze a novel global database of soil infiltration measurements, the Soil Water Infiltration Global (SWIG) database. In total, 5023 infiltration curves were collected across all continents in the SWIG database. These data were either provided and quality checked by the scientists who performed the experiments or they were digitized from published articles. Data from 54 different countries were included in the database with major contributions from Iran, China, and the USA. In addition to its extensive geographical coverage, the collected infiltration curves cover research from 1976 to late 2017. Basic information on measurement location and method, soil properties, and land use was gathered along with the infiltration data, making the database valuable for the development of pedotransfer functions (PTFs) for estimating soil hydraulic properties, for the evaluation of infiltration measurement methods, and for developing and validating infiltration models. Soil textural information (clay, silt, and sand content) is available for 3842 out of 5023 infiltration measurements (~76%) covering nearly all soil USDA textural classes except for the sandy clay and silt classes. Information on land use is available for 76% of the experimental sites with agricultural land use as the dominant type (~40%). We are convinced that the SWIG database will allow for a better parameterization of the infiltration process in land surface models and for testing infiltration models. All collected data and related soil characteristics are provided online in *.xlsx and *.csv formats for reference, and we add a disclaimer that the database is for public domain use only and can be copied freely by referencing it. Supplementary data are available at https://doi.org/10.1594/PANGAEA.885492 (Rahmati et al., 2018). Data quality assessment is strongly advised prior to any use of this database. Finally, we would like to encourage scientists to extend and update the SWIG database by uploading new data to it.

109. Sotiropoulos S., I.K. Kalavrouziotis, S.Varnavas, Ch. Paschalidis, **V. Kavvadias**, P. H. Koukoulakis, A. Koriki & G. Xirogiannis (2018). Elemental Relationships and Growth and Development of Spinach Grown with Sewage Sludge, **Communications in Soil Science and Plant Analysis**, 49:9, 1009-1021, DOI: 10.1080/00103624.2018.1448411

A pot experiment with spinach (Spinacia oleraceae L. Fam.: Chenopodiaceae) was conducted

aiming to investigate the effect of the addition of sewage sludge (SS) on soil substrate, the growth of spinach, and the plant interactions of CaxCd and ZnxCd. There were six substrates obtained by mixing soil and sludge in different proportions by volume (20:1, 10:1, 6.7:1, 5.0:1, 4.0:1, 3.3:1) and a control (only soil). The highest biomass was achieved in treatments 20:1 and 10:1. There was not a linear increase due to toxicity when SS was added in higher proportions. Sludge improved soil fertility by increasing organic matter and total N. Furthermore, in all plant parts of spinach, the Ca and Zn contents were synergistically interrelated with the Cd content, facilitating Cd uptake. The use of sewage sludge as soil amendment is not applicable on agricultural land due to the accumulation of Cd in plant.

110. Touka A, Vareli K, Igglezou M, **Monokrousos N**, Alivertis D, Halley JM, Hadjikakou S, Frillingos S, Sainis I (2018). Ancient European Lakes: Reservoirs of Hidden Microbial Diversity? The Case of Lake Pamvotis (NW Greece). **Journal of Open Ecology** 8, 537-578.
Ancient European lakes are clustered within a radius of 300 km around Lake Ohrid. Information concerning microbial diversity in these lakes is limited. We studied diversity of the dominant prokaryotic phylotypes in the sediments in one of these lakes, known as Lake Pamvotis. The analysis was performed in samples from two stations for four seasons of the same year. DNA extraction followed by PCR amplification (16S rDNA), Denaturing Gradient Gel Electrophoresis, cloning and sequencing was applied in order to reveal the sequence signatures of the dominant bacterial and archaeal phylotypes. Bacterial and archaeal cell numbers were quantified by real-time PCR. Several environmental variables measured in parallel, including pH, Nickel, Chromium, Arsenic, Calcium, Total Nitrogen and Total Carbon, were found to affect strongly the prokaryotic abundances. Most of the identified sequences of Bacteria belong to Proteobacteria and most of the sequences of Archaea belong to Euryarchaeota . The great majority of these bacterial (84.21%) and archaeal sequences (95.65%) have no cultivated counterparts in the databases. In addition, many of these bacterial (50.88%) and archaeal sequences (20.65%) correspond to potentially new species. Six of the bacterial sequences constitute a new class of Cyanobacteria which we have named “Lake Pamvotis cluster” (LPC). Our findings highlight Lake Pamvotis as a habitat for several previously unidentified species of Bacteria and Archaea.

111. Tsakmakis, I. D., Kokkos, N. P., Gikas, G. D., **Pisinaras, V., Hatzigiannakis**, E., **Arampatzis**, G., & Sylaios, G. K. (2019). Evaluation of AquaCrop model simulations of cotton growth under deficit irrigation with an emphasis on root growth and water extraction patterns. **Agricultural Water Management**, 213, 419-432.
One of the most vital parameters for the robust crop growth models’ performance is the crops’ root growth pattern. However, its reference measurement methods are laborious, destructive and costly. In this paper we determined the root growth pattern of cotton (Gossypium hirsutum) in the 50 to 100 cm top-soil layer using soil water content measurements from the cotton cultivating seasons of 2015 and 2016 in Northern Greece. The estimated root growth pattern along with canopy cover, biomass, soil water content and final seed cotton yield measurements were then used to evaluate the capability of the FAO AquaCrop model to simulate a deficit irrigated cotton, cultivated under real farming conditions. To do so, a number of existing cotton crop files from the literature were tested. The results showed that the estimated root growth patterns were almost the same in 2015 and 2016 exhibiting root growing rates equal to 1.7 and 2 cm/d, respectively. When the model was run in growing degree days mode, it simulated root growth pattern, canopy cover, biomass and soil water

content with fair accuracy for all the proposed crop files (R2 ≥ 0.93, modeling efficiency ≥ 0.91), but the seed cotton yield was simulated adequately only when the AquaCrop's library file was used. In calendar days mode the model failed to simulate root growth pattern satisfactorily, but the simulation of canopy cover, biomass and soil water content was fair (R2 ≥ 0.75, model efficiency ≥ 0.72). Lastly, the seed cotton yield in the calendar days mode was once again simulated accurately only when the model's default crop file was used.

112. Tsiafouli MA, **Monokrousos N**, Sgardelis SP (2018). Drought in spring increases microbial carbon loss through respiration in a Mediterranean pine forest. **Soil Biology & Biochemistry** 119, 59-62.

We investigated the effect of drought in spring (earlier onset of summer drought) on litter decomposition in a Mediterranean pine forest, in Greece. We exposed litterbags filled with decomposed or fresh pine litter in the forest floor from January to November and simulated drought from April to May (season with usually high activity in soil). The drought treatment resulted in a significant increase of microbial respiration and litter weight loss and a decrease of microbial C. Both litter types were similarly affected by drought, but differed in parameters related to decomposer community succession (Collembola and Acari abundances, organic C and N, microbial N). Our results indicate that drought during the highly biologically active season might have significant implications for soil Carbon sequestration/storage.

113. Vrekos C., Evagelides C., Samarinas N. and **Arampatzis G.,** 2018. Critical Terrain Slope Calculation for Locating Small Hydropower Plants. **International journal of environmental and ecological engineering**, vol. 12(2), 96-100.

As known the water energy is a renewable and clean source of energy. Energy production from hydropower has been the first, and still is today, a renewable source used to generate electricity. The optimal location and sizing of a small hydropower plant is a very important issue in engineering design which encourages investigation. The aim of this paper is to present a formula that can be utilized for locating the position of a small hydropower plant. Although, there is a high dependence on economic, environmental and social parameters. In this paper the economic and technical side of the problem is considered. More specifically, there is a critical terrain slope that determines if the plant should be located at the end of the slope or not. Of course this formula can be used for a first estimate and does not include detailed economic analysis. At the end, a case study is presented for the location of a small hydropower plant in order to demonstrate the validity of the proposed formula.

114. Whyte, A., **Ferentinos, K.P.**, Petropoulos, G.P. 2018. A new synergistic approach for monitoring wetlands using Sentinels -1 and 2 data with object-based machine learning algorithms. **Environmental Modelling and Software**, 104, 40-54. doi: 10.1016/j.envsoft.2018.01.023

In this work the synergistic use of Sentinel-1 and 2 combined with the System for Automated Geoscientific Analyses (SAGA)Wetness Index in the content of land use/cover (LULC) mapping with emphasis in wetlands is evaluated. A further objective has been to develop a new Object-based Image Analysis (OBIA) approach for mapping wetland areas using Sentinel-1 and 2 data, where the latter is also tested against two popular machine learning algorithms (Support Vector Machines - SVMs and Random Forests - RFs). The highly vulnerable iSimangaliso Wetland Park was used as the study site. Results showed that two-part image segmentation could efficiently create object

features across the study area. For both classification algorithms, an increase in overall accuracy was observed when the full synergistic combination of available datasets. A statistically significant difference in classification accuracy at all levels between SVMs and RFs was also reported, with the latter being up to 2.4% higher. SAGA wetness index showed promising ability to distinguish wetland environments, and in combination with Sentinel-1 and 2 synergies can successfully produce a land use and land cover classification in a location where both wetland and non-wetland classes exist.

115. Ziogas, V., Molassiotis, A., Fotopoulos, V., **Tanou, G.**, 2018. Hydrogen sulfide: A potent tool in postharvest fruit biology and possible mechanism of action. **Frontiers in Plant Science,** 9: 1375, Art. doi:10.3389/fpls.2018.01375

Hydrogen sulfide (H2S), an endogenous gaseous molecule, is considered as a signaling agent, in parallel with other low molecular weight reactive substances, mainly hydrogen peroxide (H2O2) and nitric oxide (NO), in various plant systems. New studies are now revealing that the postharvest application of H2S, through H2S donors such as sodium hydrosulfide (NaSH) or sodium sulfide (Na2S), can inhibit fruit ripening and senescence programs in numerous fruits. We discuss here current knowledge on the impact of H2S in postharvest physiology of several climacteric and non-climacteric fruits such as banana, apple, pear, kiwifruit, strawberry, mulberry fruit, and grape. Although there is still a considerable lack of studies establishing the mechanisms by which H2S signaling is linked to fruit metabolism, we highlight several candidate mechanisms, including a putative cross-talk between H2S and ethylene, reactive oxygen and nitrogen species, oxidative/nitrosative stress signaling, sulfate metabolism, and post-translational modification of protein cysteine residues (S-sulfhydration) as being functional in this H2S postharvest action. Understanding H2S metabolism and signaling during postharvest storage and the interplay with other key player molecules would therefore provide new, improved strategies for better fruit postharvest storage. To achieve this understanding, postharvest fruit physiology research will need to focus increasingly on the spatial interaction between H2S and ethylene perception as well as on the interplay between S-sulfhydration/desulfhydration and S-nitrosylation/denitrosylation under several postharvest conditions

2. Σε Διεθνή Συνέδρια και ημερίδες
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